[illegible]	Current Scenario Value
Distribution Cable Fill - 0	0 50
Distribution Cable Fill - 5	0 55
Distribution Cable Fill - 100	0 55
Distribution Cable Fill - 200	0 60
Distribution Cable Fill - 650	0 65
Distribution Cable Fill - 850	0 70
Distribution Cable Fill - 2550	0 75
Distribution Cable Fill - 5000	0 75
Distribution Cable Fill - 10000	0 75
Buried Fraction - 0	0 60
Buried Fraction - 5	0 61
Buried Fraction - 100	0 62
Buried Fraction - 200	0 62
Buried Fraction - 650	0 65
Buried Fraction - 850	0 65
Buried Fraction - 2550	0 85
Buried Fraction - 5000	0 85
Buried Fraction - 10000	0 05
Aerial Cable Fraction - 0	0 40
Aerial Cable Fraction - 5	0 37
Aerial Cable Fraction - 100	0 33
Aerial Cable Fraction - 200	0 30
Aerial Cable Fraction - 650	0 20
Aerial Cable Fraction - 850	0 10
Aerial Cable Fraction - 2550	0 05
Aerial Cable Fraction - 5000	0 05
Aerial Cable Fraction - 10000	0 85
Pole Spacing, feet - 0	250
Pole Spacing, feet - 5	250
Pole Spacing, feet - 100	200
Pole Spacing, feet - 200	200
Pole Spacing, feet - 650	175
Pole Spacing, feet - 850	175
Pole Spacing, feet - 2550	150
Pole Spacing, feet - 5000	150
Pole Spacing, feet - 10000	150
Drop Distance, feet - 0	200
Drop Distance, feet - 5	200
Drop Distance, feet - 100	150
Drop Distance, feet - 200	150
Drop Distance, feet - 650	50
Drop Distance, feet - 850	50
Drop Distance, feet - 2550	50
Drop Distance, feet - 5000	50
Drop Distance, feet - 10000	50
Aerial Drop Placement (total) - 0	117 00
Aerial Drop Placement (total) - 5	117 00
Aerial Drop Placement (total) - 100	87 75
Aerial Drop Placement (total) - 200	87 75
Aerial Drop Placement (total) - 650	25 65
Aerial Drop Placement (total) - 850	25 65
Aerial Drop Placement (total) - 2550	25 65
Aerial Drop Placement (total) - 5000	25 65
Aerial Drop Placement (total) - 1000	25 65
Buried Drop Placement (total) - 0	0 48
Buried Drop Placement (total) - 5	0 63
Buried Drop Placement (total) - 100	0 63
Buried Drop Placement (total) - 200	0 63
Buried Drop Placement (total) - 650	0 63
Buried Drop Placement (total) - 850	0 63
Buried Drop Placement (total) - 255	0 79
Buried Drop Placement (total) - 500	1 57
Buried Drop Placement (total) - 100	5 24
Buried Drop Sharing Fraction - 0	0 10
Buried Drop Sharing Fraction - 5	0 10
Buried Drop Sharing Fraction - 100	0 10
Buried Drop Sharing Fraction - 200	0 10

Feeder Input	Current Scenario Value
Copper Feeder Fill - 0	0 65
Copper Feeder Fill - 5	0 75
Copper Feeder Fill - 100	0 80
Copper Feeder Fill - 200	0 80
Copper Feeder Fill - 650	0 80
Copper Feeder Fill - 850	0 80
Copper Feeder Fill - 2550	0 80
Copper Feeder Fill - 5000	0 80
Copper Feeder Fill - 10000	0 80
Fiber Feeder Strand Fill - 0	1 00
Fiber Feeder Strand Fill - 5	1 00
Fiber Feeder Strand Fill - 100	1 00
Fiber Feeder Strand Fill - 200	1 00
Fiber Feeder Strand Fill - 650	1 00
Fiber Feeder Strand Fill - 850	1 00
Fiber Feeder Strand Fill - 2550	1 00
Fiber Feeder Strand Fill - 5000	1 00
Fiber Feeder Strand Fill - 10000	1 00
Copper Aerial Fraction - 0	0 40
Copper Aerial Fraction - 5	0 40
Copper Aerial Fraction - 100	0 40
Copper Aerial Fraction - 200	0 40
Copper Aerial Fraction - 650	0 25
Copper Aerial Fraction - 850	0 10
Copper Aerial Fraction - 2550	-
Copper Aerial Fraction - 5000	-
Copper Aerial Fraction - 10000	-
Copper Buried Fraction - 0	0 50
Copper Buried Fraction - 5	0 45
Copper Buried Fraction - 100	0 40
Copper Buried Fraction - 200	0 35
Copper Buried Fraction - 650	0 30
Copper Buried Fraction - 850	0 25
Copper Buried Fraction - 2550	0 20
Copper Buried Fraction - 5000	0 10
Copper Buried Fraction - 10000	0 05
Copper Manhole Spacing, feet - 0	800
Copper Manhole Spacing, feet - 5	800
Copper Manhole Spacing, feet - 100	800
Copper Manhole Spacing, feet - 200	800
Copper Manhole Spacing, feet - 650	600
Copper Manhole Spacing, feet - 850	600
Copper Manhole Spacing, feet - 2550	600
Copper Manhole Spacing, feet - 5000	400
Copper Manhole Spacing, feet - 10000	400
Fiber Aerial Fraction - 0	0 40
Fiber Aerial Fraction - 5	0 40
Fiber Aerial Fraction - 100	0 40
Fiber Aerial Fraction - 200	0 40
Fiber Aerial Fraction - 650	0 25
Fiber Aerial Fraction - 850	0 10
Fiber Aerial Fraction - 2550	-
Fiber Aerial Fraction - 5000	-
Fiber Aerial Fraction - 10000	-
Fiber Buried Fraction - 0	0 50
Fiber Buried Fraction - 5	0 45
Fiber Buried Fraction - 100	0 40
Fiber Buried Fraction - 200	0 35
Fiber Buried Fraction - 650	0 30
Fiber Buried Fraction - 850	0 25
Fiber Buried Fraction - 2550	0 20
Fiber Buried Fraction - 5000	0 10
Fiber Buried Fraction - 10000	0 05
Fiber Pullbox Spacing feet - 0	2,000 00
Fiber Pullbox Spacing feet - 5	2,000 00
Fiber Pullbox Spacing feet - 100	2,000 00
Fiber Pullbox Spacing feet - 200	2 000 00

[illegible]	Current Scenario Value
Constant EO Switching Investment Ter	-
Constant EO Switching Investment Ter	-
Switch Capacity Real-Time (BHCA) - 1	10,000
Switch Capacity Real-Time (BHCA) - 2	50,000
Switch Capacity Real-Time (BHCA) - 3	200,000
Switch Capacity Real-Time (BHCA) - 4	600,000
Switch Capacity Traffic (BHCCS) - 1	30,000
Switch Capacity Traffic (BHCCS) - 2	150,000
Switch Capacity Traffic (BHCCS) - 3	600,000
Switch Capacity Traffic (BHCCS) - 4	1,800,000
Initial Switch Maximum Equipped Line	80,000
Switch Port Administrative Fill	0 98
Switch Mamimim Processor Occupancy	0 90
Processor Feature Loading Multiplier -	1 00
Processor Feature Loading Multiplier -	1 00
Processor Feature Loading Multiplier -	1 00
MDF/Protector Investment per line	-
Analog Line Circuit Offset for DLC lines,	-
Switch Installation Multiplier	1 00
Operator Traffic Fraction	0 02
Total Interoffice Traffic Fraction	0 65
Maximum Trunk Occupancy, CCS	27 50
Trunk Port, per end	100 00
Entrance Facility Distance, miles	0 50
Direct-routed Fraction of Local Interoffic	0 98
POPs per Tandem Location	5 00
Tandem-routed Fraction of Total IntraL	0 20
Tandem-routed Fraction of Total InterL	0 20
Local Call Attempts	772,562
Call Completion Factor	0 70
IntraLATA Calls Completed	26,484
InterLATA intrastate Calls Completed	14,731
InterLATA interstate Calls Completed	83,546
Local DEMs, thousands	5,006,559
Intrastate DEMs, thousands	407,636
Interstate DEMs, thousands	1,325,727
Local Business/Residence DEMs	1 10
Intrastate Business/Residence DEMs	2 00
Interstate Business/Residence DEMs	3 00
BH Fraction of Daily Usage	0 10
Annual to Daily Usage Reduction Facto	270 00
Residential Holding Time Multiplier	1 00
Business Holding Time Multiplier	1 00
Residential Call Attempts per BH	1 30
Business Call Attempts per BH	3 50
ICO STP Investment, per line (equipme	5 50
ICO Local Tandem Investment, per line	1 90
ICO OS Tandem Investment, per line	0 80
ICO SCP Investment per line (equipme	2 50
ICO SCP - STP per line (wirecenter)	0 40
ICO Local Tandem Investment, per line	2 50
ICO OS Tandem Investment, per line (	1 00
ICO Tandem A Links and C Links per li	0 30
Real-time Limit, BHCA	750,000
Port Limit, trunks	100,000
Common Equipment Investment	1,000,000
Maximum Port Fill	0 90
Maximum Real-time Occupancy	0 90
Common Equipment Intercept Factor	0 50
STP Link Capacity	720
STP Maximum Link Fill	0 80
Maximum STP Investment, per pair	5,000,000
Minimum STP Investment, per pair	1,000,000
Link Termination, both ends	900
Signaling Link Bit Rate	56,000
Link Occupancy	0 40
C Link Cross Section	24 00
ISUP Messages per Interoffice BHCA	6 00

Expense Input	Current Scenario Value
Cost of Debt	0 0707
Debt Fraction	0 4500
Cost of Equity	0 1467
Average Trunk Utilization	0 300
Tax Rate	0 150
Corporate Overhead Factor	0 104
Other Taxes Factor	0 050
Billing/Bill Inquiry per line per month	
Directory Listing per line per month	
Forward-looking Network Operations Factor	0 500
Alternative CO Switching Factor	0 040
Alternative Circuit Equipment Factor	0 019
EO Traffic Sensitive Fraction	0 580
Monthly LNP cost, per line	0 250
Carrier to Carrier Customer Service, per line per	1 69
NID Expense per line per year	1 00
DS-0/DS-1 Terminal Factor	12 4
DS-1/DS-3 Terminal Factor	9 9
Average Lines per Business Location	4
Distribution Aerial Shring Fraction - 0	0 33
Distribution Aerial Shring Fraction - 5	0 33
Distribution Aerial Shring Fraction - 100	0 33
Distribution Aerial Shring Fraction - 200	0 10
Distribution Aerial Shring Fraction - 650	0 10
Distribution Aerial Shring Fraction - 850	0 10
Distribution Aerial Shring Fraction - 2550	0 10
Distribution Aerial Shring Fraction - 5000	0 10
Distribution Aerial Shring Fraction - 10000	0 10
Distribution Buried Shring Fraction - 0	0 86
Distribution Buried Shring Fraction - 5	0 86
Distribution Buried Shring Fraction - 100	0 86
Distribution Buried Shring Fraction - 200	0 10
Distribution Buried Shring Fraction - 650	0 10
Distribution Buried Shring Fraction - 850	0 10
Distribution Buried Shring Fraction - 2550	0 10
Distribution Buried Shring Fraction - 5000	0 10
Distribution Buried Shring Fraction - 10000	0 10
Distribution Underground Shring Fraction - 0	0 50
Distribution Underground Shring Fraction - 5	0 50
Distribution Underground Shring Fraction - 100	0 50
Distribution Underground Shring Fraction - 200	0 10
Distribution Underground Shring Fraction - 650	0 10
Distribution Underground Shring Fraction - 850	0 10
Distribution Underground Shring Fraction 2550	0 10
Distribution Underground Shring Fraction 5000	0 10
Distribution Underground Shring Fraction 1000	0 10
Feeder Aerial Shring Fraction - 0	1 00
Feeder Aerial Shring Fraction - 5	1 00
Feeder Aerial Shring Fraction - 100	1 00
Feeder Aerial Shring Fraction - 200	0 33
Feeder Aerial Shring Fraction - 650	0 33
Feeder Aerial Shring Fraction - 850	0 33
Feeder Aerial Shring Fraction - 2550	0 33
Feeder Aerial Shring Fraction - 5000	0 33
Feeder Aerial Shring Fraction - 10000	0 33
Feeder Underground Shring Fraction - 0	1 00
Feeder Underground Shring Fraction - 5	1 00
Feeder Underground Shring Fraction 100	1 00
Feeder Underground Shring Fraction - 200	0 33
Feeder Underground Shring Fraction 650	0 33
Feeder Underground Shring Fraction 850	0 33
Feeder Underground Shring Fraction - 2550	0 33
Feeder Underground Shring Fraction - 5000	0 33
Feeder Underground Shring Fraction - 10000	0 33
Feeder Buried Shring Fraction 0	1 00
Feeder Buried Shring Fraction - 5	1 00
Feeder Buried Shring Fraction 100	1 00
Feeder Buried Shring Fraction - 200	0 40

[illegible]	Current Scenario Value
Buried Drop Sharing Fraction - 5000	0.10
Buried Drop Sharing Fraction - 10000	0.10
Buried Drop Fraction - 0	0.60
Buried Drop Fraction - 5	0.63
Buried Drop Fraction - 100	0.67
Buried Drop Fraction - 200	0.70
Buried Drop Fraction - 650	0.80
Buried Drop Fraction - 850	0.90
Buried Drop Fraction - 2550	0.95
Buried Drop Fraction - 5000	0.95
Buried Drop Fraction - 10000	1.00
Pole Investment	310.65
Pole Labor	1.00
Buried Cable Jacketing Multiplier	1.20
Conduit Investment per foot	0.60
Spare Tubes per route	1.00
Regional Labor Adjustment Factor (	1.00
Residential NID case, no protector	10.00
Residential NID basic labor	15.00
spare	6.00
Residential Protection Block, per pai	4.00
Business NID case, no protector	25.00
Business NID basic labor	15.00
Business Protection Block, per pair	4.00
Average Lines per business location	4.00
Terminal and Splice per line, buried	42.50
Terminal and Splice per line, aerial	32.00
Drop cable investment per foot burie	0.08
Drop cable buried pairs	3.00
Drop cable investment per foot aeria	0.038
Drop cable aerial pairs	2.00
DS-0 fraction	1.00
DS-1 fraction	-
DS-0 pair equivalent	1.00
DS-1 pair equivalent	2.00
DS-3 pair equivalent	56.00
Indoor NID case	5.00
Buried fraction available for shift - 0	-
Buried fraction available for shift - 5	-
Buried fraction available for shift - 1	-
Buried fraction available for shift - 2	-
Buried fraction available for shift - 6	-
Buried fraction available for shift - 8	-
Buried fraction available for shift - 2	-
Buried fraction available for shift - 5	-
Buried fraction available for shift - 1	-
Wireless Investment Cap Enabled	TRUE
Wireless Point to Point Inv cap - dist	10,000.00
Wireless Common inv, broadcast	112,500.00
Wireless per line inv, broadcast	500.00
Maximum broadcast lines for comm	30.00
TR-303 DLC Site and Power	3,000.00
TR-303 DLC Maximum Lines/Incre	672.00
TR-303 DLC RT Fill Factor	0.90
TR-303 DLC Basic Common Eqpt In	66,000.00
TR-303 DLC POTS Channel Unit In	310.00
TR-303 DLC POTS Lines per CU	4.00
TR-303 DLC Coin Channel Unit Inv	250.00
TR-303 DLC Coin Lines per CU	2.00
TR-303 DLC 303/LD crossover, line	480.00
TR-303 DLC Fibers per RT	4.00
TR-303 DLC Optical Patch Panel	1,000.00
TR-303 DLC Copper Feeder Max Di	9,000.00
TR-303 DLC Common Eqpt Invest p	18,500.00
TR-303 DLC Maximum Number of a	2.00
Low Density DLC Site and Power	1,300
Low Density DLC Maximum Lines/In	120.00

Feeder Input	Current Scenario Value
Fiber Pullbox Spacing, feet - 5000	2,000.00
Fiber Pullbox Spacing, feet - 10000	2,000.00
Fiber Feeder Investment per foot - 216	6.37
Fiber Feeder Investment per foot - 144	4.25
Fiber Feeder Investment per foot - 96	2.83
Fiber Feeder Investment per foot - 72	2.12
Fiber Feeder Investment per foot - 60	1.77
Fiber Feeder Investment per foot - 48	1.42
Fiber Feeder Investment per foot - 36	1.06
Fiber Feeder Investment per foot - 24	0.71
Fiber Feeder Investment per foot - 18	0.53
Fiber Feeder Investment per foot - 12	0.35
Copper Feeder Investment per foot - 4200	42.24
Copper Feeder Investment per foot - 3600	36.21
Copper Feeder Investment per foot - 3000	30.17
Copper Feeder Investment per foot - 2400	24.14
Copper Feeder Investment per foot - 1800	18.10
Copper Feeder Investment per foot - 1200	12.07
Copper Feeder Investment per foot - 900	9.05
Copper Feeder Investment per foot - 600	6.03
Copper Feeder Investment per foot - 400	4.02
Copper Feeder Investment per foot - 200	2.01
Copper Feeder Investment per foot - 100	1.01
Buried Copper Cable Sheath Multiplier	1.20
Buried Fiber Sheath Addition per foot	1.03
Pole Materials	310.65
Pole Labor	1.00
Conduit Material Investment per foot	0.60
Inner Duct Investment per foot	0.30
Spare Tubes per section	1.00
Regional Labor Adjustment Factor (see La	1.00
Pole Spacing, feet - 0	250.00
Pole Spacing, feet - 5	250.00
Pole Spacing, feet - 100	200.00
Pole Spacing, feet - 200	200.00
Pole Spacing, feet - 650	175.00
Pole Spacing, feet - 850	175.00
Pole Spacing, feet - 2550	150.00
Pole Spacing, feet - 5000	150.00
Pole Spacing, feet - 10000	150.00
Buried fraction available for shift - 0	-
Buried fraction available for shift - 5	-
Buried fraction available for shift - 100	-
Buried fraction available for shift - 200	-
Buried fraction available for shift - 650	-
Buried fraction available for shift - 850	-
Buried fraction available for shift - 2550	-
Buried fraction available for shift - 5000	-
Buried fraction available for shift - 10000	-
Fiber investment/strand - foot	0.0245
Copper investment/pair - foot	0.0080
Copper Manhole Materials - 0	1865
Copper Manhole Materials - 5	1865
Copper Manhole Materials - 100	1865
Copper Manhole Materials - 200	1865
Copper Manhole Materials - 650	1865
Copper Manhole Materials - 850	1865
Copper Manhole Materials - 2550	1865
Copper Manhole Materials - 5000	1865
Copper Manhole Materials - 10000	1865
Copper Manhole Frame and Cover - 0	350.00
Copper Manhole Frame and Cover - 5	350.00
Copper Manhole Frame and Cover - 100	350.00
Copper Manhole Frame and Cover - 200	350.00
Copper Manhole Frame and Cover - 650	350.00
Copper Manhole Frame and Cover - 850	350.00
Copper Manhole Frame and Cover - 2550	350.00
Copper Manhole Frame and Cover - 5000	350.00

[illegible]	Value
TCAP Message length, bytes	100.00
Fraction of BHCA requiring TCAP	0.10
SCP Investment/Transaction/Second	20,000
Operator investment per position	6,400
Operator Maximum Utilization, per posit	32
Operator Intervention Factor	10
Public Telephone Investment, per statio	760
Lot Size, Multiplier of Switch Room Size	2
Tandem/EO Wire Center Common Fact	0.40
Power Investment 1	-
Power Investment 2	-
Power Investment 3	-
Power Investment 4	-
Power Investment 5	-
Switch Room Size, sq ft 1	500
Switch Room Size, sq ft 2	1,000
Switch Room Size, sq ft 3	2,000
Switch Room Size, sq ft 4	5,000
Switch Room Size, sq ft 5	10,000
Construction Investment, sq ft 1	75.00
Construction Investment, sq ft 2	85.00
Construction Investment, sq ft 3	100.00
Construction Investment, sq ft 4	125.00
Construction Investment, sq ft 5	150.00
Land Investment, sq ft 1	5
Land Investment, sq ft 2	8
Land Investment, sq ft 3	10
Land Investment, sq ft 4	15
Land Investment, sq ft 5	20
OC-48 ADM, installed, 48 DS-3s	50,000
OC-48 ADM, installed, 12 DS-3s	40,000
OC-3/DS-1 Terminal Multiplexer, install	28,000
Investment per 7 DS-1s	500
Number of Fibers	24
Pigtails, per strand	60
Optical Distribution Panel	1,000
EF&I, per hour	55
EF&I hours	32
Regional Labor Adjustment Factor (see	1
Channel Bank Investment, per 24 lines	5,000
Fraction of SA Lines Requiring Multiple	-
Regenerator, installed	15,000
Regenerator spacing, miles	40
DCS installed, per DS-3	30,000
Transmission Terminal Fill (DS-0 level)	0.90
Fiber Investment, fiber cable	3.50
Fiber, number of strands per ADM	4.00
Fiber Investment, buried fraction	0.75
Fiber Investment, buried placement	1.77
Fiber Investment, buried sheath additio	0.20
Fiber Investment, conduit	0.60
Fiber, spare tubes per route	1.00
Fiber Investment, conduit placement	16.40
Fiber, pullbox spacing	2,000.00
Fiber Investment, pullbox investment	500.00
Fiber, aerial fraction	0.05
Fiber, pole spacing, feet	150.00
Fiber Investment, pole material	310.65
Fiber Investment, pole labor (basic)	1.00
Fraction Poles and Buried/Underground	0.75
Fraction of Aerial Structure Assigned to	0.33
Fraction of Buried Structure Assigned t	0.33
Fraction of Underground Structure Assi	0.33
Multiplicative EO Switching Investment	0
Threshold value for off-ring wire centers	1
Remote-host fraction of interoffice traffic	0.1
Host remote fraction of interoffice traffic	0.05
Maximum nodes per ring	16

Expense Input	Current Scenario Value
Feeder Buried Shring Fraction - 2550	0.40
Feeder Buried Shring Fraction - 5000	0.40
Feeder Buried Shring Fraction - 10000	0.40
Motor Vehicles - Economic Life	9.00
Garage Work Equipment - Economic Life	18.00
Other Work Equipment - Economic Life	18.00
Buildings - Economic Life	44.50
Furniture - Economic Life	15.00
Office Support Equipment - Economic Life	10.00
Company Comm. Equipment - Economic Life	7.00
General Purpose Computer - Economic Life	6.00
Digital Electronic Switching - Economic Life	17.00
Operator Systems - Economic Life	10.00
Digital Circuit Equipment - Economic Life	11.00
Public Telephone Terminal Equipment - Econo	7.00
Poles - Economic Life	33.00
Aerial Cable - metallic - Economic Life	23.00
Aerial Cable - non metallic - Economic Life	25.00
Underground Cable - metallic - Economic Life	25.00
Underground Cable - non metallic - Economic Li	30.00
Buried - metallic - Economic Life	25.00
Buried - non metallic - Economic Life	30.00
Intrabuilding Cable - metallic - Economic Life	20.00
Intrabuilding Cable - non metallic - Economic Lif	25.00
Conduit Systems - Economic Life	50.00
Motor Vehicles - Net Salvage %	0.1500
Garage Work Equipment - Net Salvage %	0.0000
Other Work Equipment - Net Salvage %	0.0600
Buildings - Net Salvage %	0.0200
Furniture - Net Salvage %	0.0000
Office Support Equipment - Net Salvage %	0.0000
Company Comm. Equipment - Net Salvage %	0.0000
General Purpose Computer - Net Salvage %	0.0000
Digital Electronic Switching - Net Salvage %	0.0400
Operator Systems - Net Salvage %	0.0000
Digital Circuit Equipment - Net Salvage %	0.0100
Public Telephone Terminal Equipment - Net Sal	0.0000
Poles - Net Salvage %	-0.5000
Aerial Cable - metallic - Net Salvage %	-0.1000
Aerial Cable - non metallic - Net Salvage %	-0.1000
Underground Cable - metallic - Net Salvage %	0.0200
Underground Cable - non metallic - Net Salvage	-0.0500
Buried - metallic - Net Salvage %	-0.0300
Buried - non metallic - Net Salvage %	0.0000
Intrabuilding Cable - metallic - Net Salvage %	-0.0200
Intrabuilding Cable - non metallic - Net Salvage	0.0200
Conduit Systems - Net Salvage %	-0.0300
Furniture - Capital Costs - % assigned per line	1.0000
Furniture - Expenses - % assigned per line	1.0000
Office Equipment - Capital Costs - % assigned p	1.0000
Office Equipment - Expenses - % assigned per li	1.0000
General Purpose Computer - Capital Costs - % a	1.0000
General Purpose Computer - Expenses - % assi	1.0000
Motor Vehicles - Capital Costs - % assigned per l	0.5000
Motor Vehicles - Expenses - % assigned per line	0.5000
Buildings - Capital Costs - % assigned per line	1.0000
Buildings - Expenses - % assigned per line	1.0000
Garage Work Eqpt - Capital Costs - % assigned	1.0000
Garage Work Eqpt - Expenses - % assigned per	1.0000
Other Work Eqpt - Capital Costs - % assigned p	1.0000
Other Work Eqpt - Expenses - % assigned per li	1.0000
Network Operations - % assigned per line	1.0000
Other Taxes - % assigned per line	1.0000
Variable Overhead - % assigned per line	1.0000

[illegible]	Current Scenario Value
Low Density DLC POTS Lines per C	6 00
Low Density DLC Coin Channel Unit	600 00
Low Density DLC Coin Lines per C	6 00
Low Density DLC Fibers per RT	4 00
Low Density DLC Optical Patch Pan	1,000 00
Low Density DLC Common Eqpt Inv	9,400 00
Low Density DLC Maximum Numbe	1 00
Distribution Cable Size 1	2,400 00
Distribution Cable Size 2	1,800 00
Distribution Cable Size 3	1,200 00
Distribution Cable Size 4	900 00
Distribution Cable Size 5	600 00
Distribution Cable Size 6	400 00
Distribution Cable Size 7	200 00
Distribution Cable Size 8	100 00
Distribution Cable Size 9	50 00
Distribution Cable Size 10	25 00
Distribution Cable Size 11	12 00
Distribution Cable Size 12	6 00
Distribution Cable Investment per fo	24 14
Distribution Cable Investment per fo	18 10
Distribution Cable Investment per fo	12 07
Distribution Cable Investment per fo	9 05
Distribution Cable Investment per fo	6 03
Distribution Cable Investment per fo	4 02
Distribution Cable Investment per fo	2 01
Distribution Cable Investment per fo	1 01
Distribution Cable Investment per fo	0 50
Distribution Cable Investment per fo	0 25
Distribution Cable Investment per fo	0 12
Distribution Cable Investment per fo	0 06
Distribution Riser Cable Size 1	2,400 00
Distribution Riser Cable Size 2	1,800 00
Distribution Riser Cable Size 3	1,200 00
Distribution Riser Cable Size 4	900 00
Distribution Riser Cable Size 5	600 00
Distribution Riser Cable Size 6	400 00
Distribution Riser Cable Size 7	200 00
Distribution Riser Cable Size 8	100 00
Distribution Riser Cable Size 9	50 00
Distribution Riser Cable Size 10	25 00
Distribution Riser Cable Size 11	12 00
Distribution Riser Cable Size 12	6 00
Distribution Riser Cable Investment	25 00
Distribution Riser Cable Investment	20 00
Distribution Riser Cable Investment	15 00
Distribution Riser Cable Investment	12 50
Distribution Riser Cable Investment	10 00
Distribution Riser Cable Investment	7 50
Distribution Riser Cable Investment	5 30
Distribution Riser Cable Investment	3 15
Distribution Riser Cable Investment	2 05
Distribution Riser Cable Investment	1 50
Distribution Riser Cable Investment	0 95
Distribution Riser Cable Investment	0 80
Distance Multiplier for difficult terrain	1 00
Rock Depth Threshold, inches	24 00
Hard Rock Placement Multiplier	3 00
Soft Rock Placement Multiplier	2 00
Sidewalk/Street Fraction	0 20
Local RT - Maximum Total Distance	18,000 00
SAI Cable Size 1	7,200 00
SAI Cable Size 2	5,400 00
SAI Cable Size 3	3,600 00
SAI Cable Size 4	2,400 00
SAI Cable Size 5	1,800

Feeder Input	Current Scenario Value
Copper Manhole Site Delivery - 5	125 00
Copper Manhole Site Delivery - 100	125 00
Copper Manhole Site Delivery - 200	125 00
Copper Manhole Site Delivery - 650	125 00
Copper Manhole Site Delivery - 850	125 00
Copper Manhole Site Delivery - 2550	125 00
Copper Manhole Site Delivery - 5000	125 00
Copper Manhole Site Delivery - 10000	125 00
Copper Manhole Excavate and Backfill - 0	2,800
Copper Manhole Excavate and Backfill - 5	2,800
Copper Manhole Excavate and Backfill - 10	2,800
Copper Manhole Excavate and Backfill - 20	2,800
Copper Manhole Excavate and Backfill - 65	3,200
Copper Manhole Excavate and Backfill - 85	3,500
Copper Manhole Excavate and Backfill - 25	3,500
Copper Manhole Excavate and Backfill - 50	5,000
Copper Manhole Excavate and Backfill - 10	5,000
Fiber Pullbox Materials - 0	280 00
Fiber Pullbox Materials - 5	280 00
Fiber Pullbox Materials - 100	280 00
Fiber Pullbox Materials - 200	280 00
Fiber Pullbox Materials - 650	280 00
Fiber Pullbox Materials - 850	280 00
Fiber Pullbox Materials - 2550	280 00
Fiber Pullbox Materials - 5000	280 00
Fiber Pullbox Materials - 10000	280 00
Fiber Pullbox Installation - 0	220 00
Fiber Pullbox Installation - 5	220 00
Fiber Pullbox Installation - 100	220 00
Fiber Pullbox Installation - 200	220 00
Fiber Pullbox Installation, - 650	220 00
Fiber Pullbox Installation - 850	220 00
Fiber Pullbox Installation - 2550	220 00
Fiber Pullbox Installation - 5000	220 00
Fiber Pullbox Installation - 10000	220 00
Dewatering factor manhole excavation (ad	0 20
Water table depth for dewatering, ft	5 00

[illegible]	Current Scenario Value
Intertandem fraction of tandem trunks (	0 1
Equivalent facility investment, per DS-0	138 08
Equivalent terminal investment, per DS-	111 62
Switch line size - 1	0
Switch line size - 2	640
Switch line size - 3	5000
Switch line size - 4	10000
BOC standalone fixed inv - 1	513084
BOC standalone fixed inv - 2	513084
BOC standalone fixed inv - 3	513084
BOC standalone fixed inv - 4	513084
BOC host fixed inv - 1	513084
BOC host fixed inv - 2	513084
BOC host fixed inv - 3	513084
BOC host fixed inv - 4	513084
BOC remote fixed inv - 1	193962
BOC remote fixed inv - 2	193962
BOC remote fixed inv - 3	193962
BOC remote fixed inv - 4	193962
BOC standalone per line inv - 1	108
BOC standalone per line inv - 2	108
BOC standalone per line inv - 3	108
BOC standalone per line inv - 4	108
BOC host per line inv - 1	108
BOC host per line inv - 2	108
BOC host per line inv - 3	108
BOC host per line inv - 4	108
BOC remote per line inv - 1	110
BOC remote per line inv - 2	110
BOC remote per line inv - 3	110
BOC remote per line inv - 4	110
ICO standalone fixed inv - 1	572988
ICO standalone fixed inv - 2	572988
ICO standalone fixed inv - 3	572988
ICO standalone fixed inv - 4	572988
ICO host fixed inv - 1	572988
ICO host fixed inv - 2	572988
ICO host fixed inv - 3	572988
ICO host fixed inv - 4	572988
ICO remote fixed inv - 1	82279
ICO remote fixed inv - 2	82279
ICO remote fixed inv - 3	82279
ICO remote fixed inv - 4	82279
ICO standalone per line inv - 1	44
ICO standalone per line inv - 2	44
ICO standalone per line inv - 3	44
ICO standalone per line inv - 4	44
ICO host per line inv - 1	44
ICO host per line inv - 2	44
ICO host per line inv - 3	44
ICO host per line inv - 4	44
ICO remote per line inv - 1	140
ICO remote per line inv - 2	140
ICO remote per line inv - 3	140
ICO remote per line inv - 4	140

Expense Input	Current Scenario Value

[illegible]	Current Scenario Value	Feeder Input	Current Scenario Value	[illegible]	Expense Input	Current Scenario Value
SAI Cable Size 10	200					
SAI Cable Size 11	100					
SAI Cable Size 12	50					
SAI Indoor Investment 1	9,656					
SAI Indoor Investment 2	7,392					
SAI Indoor Investment 3	4,928					
SAI Indoor Investment 4	3,352					
SAI Indoor Investment 5	2,464 00					
SAI Indoor Investment 6	1,776 00					
SAI Indoor Investment 7	1,232 00					
SAI Indoor Investment 8	888 00					
SAI Indoor Investment 9	592 00					
SAI Indoor Investment 10	296 00					
SAI Indoor Investment 11	148 00					
SAI Indoor Investment 12	98 00					
SAI Outdoor Investment 1	10,000 00					
SAI Outdoor Investment 2	8,200 00					
SAI Outdoor Investment 3	6,000 00					
SAI Outdoor Investment 4	4,300 00					
SAI Outdoor Investment 5	3,400 00					
SAI Outdoor Investment 6	2,400 00					
SAI Outdoor Investment 7	1,900 00					
SAI Outdoor Investment 8	1,400 00					
SAI Outdoor Investment 9	1,000 00					
SAI Outdoor Investment 10	600 00					
SAI Outdoor Investment 11	350 00					
SAI Outdoor Investment 12	250 00					
Repeater Investment, installed	527 00					
Integrated COT, installed	420 00					
Remote Multiplexer Common Equip	8,200 00					
Channel Unit Investment, per subscr	125 00					
COT investment per RT, installed	1,170 00					
Remote Terminal fill factor	0 90					
Maximum T1s per cable	8 00					
T1 repeater spacing, dB	32 00					
Aerial T1 attenuation, dB/kft	6 30					
Buried T1 attenuation, dB/kft	5 00					
Feeder steering enable	FALSE					
Main feeder route/air multiplier	1					
Rectangular cluster switch	FALSE					

[illegible] ...ion/Restoration	Current Scenario Value	Buried Excavation/Restoration	Current Scenario Value	[illegible]		Effect	fraction of CBG
Trench Per Ft - 0	0 00	Plow Fraction - 0	0 00	BY	Bouldery	1	1
Trench Per Ft - 5	0 00	Plow Fraction - 5	0 00	BY-COS	Bouldery Coarse Sand	1	1
Trench Per Ft - 100	0 00	Plow Fraction - 100	0 00	BY-FSL	Bouldery & Fine Sandy Loam	1	1
Trench Per Ft - 200	0 00	Plow Fraction - 200	0 00	BY-L	Bouldery & Loam	1	1
Trench Per Ft - 650	0 00	Plow Fraction - 650	0 00	BY-LS	Bouldery & Sandy Loam	1	1
Trench Per Ft - 850	0 00	Plow Fraction - 850	0 00	BY-SICL	Bouldery & Silty Clay Loam	1	1
Trench Per Ft - 2550	0 00	Plow Fraction - 2550	0 00	BY-SL	Bouldery & Sandy Loam	1	1
Trench Per Ft - 5000	0 00	Plow Fraction - 5000	0 00	BYV	Very Bouldery	1 1	1
Trench Per Ft -10000	0 00	Plow Fraction -10000	0 00	BYV-FSL	Very Bouldery & Fine Sandy Loam	1 1	1
Backhoe Trench Fraction - 0	0 00	Plow Per Ft - 0	0 00	BYV-L	Very bouldery & Loamy	1 1	1
Backhoe Trench Fraction - 5	0 00	Plow Per Ft - 5	0 00	BYV-LS	Very Bouldery & Loamy Sand	1 1	1
Backhoe Trench Fraction - 100	0 00	Plow Per Ft - 100	0 00	BYV-SIL	Very Bouldery & Silt	1 1	1
Backhoe Trench Fraction - 200	0 00	Plow Per Ft - 200	0 00	BYV-SL	Very Bouldery & Sandy Loam	1 1	1
Backhoe Trench Fraction - 650	0 00	Plow Per Ft - 650	0 00	BYX	Extremely Bouldery	1 3	1
Backhoe Trench Fraction - 850	0 00	Plow Per Ft - 850	0 00	BYX-FSL	Extremely Bouldery & Fine Sandy Loam	1 3	1
Backhoe Trench Fraction - 2550	0 00	Plow Per Ft - 2550	0 00	BYX-L	Extremely Bouldery & Loamy	1 3	1
Backhoe Trench Fraction - 5000	0 00	Plow Per Ft - 5000	0 00	BYX-SIL	Extremely Bouldery & Silt Loam	1 3	1
Backhoe Trench Fraction -10000	0 00	Plow Per Ft -10000	0 00	BYX-SL	Extremely Bouldery & Sandy Loam	1 3	1
Backhoe Trench Per Ft - 0	0 00	Trench Per Ft - 0	0 00	C	Clay	1	1
Backhoe Trench Per Ft - 5	0 00	Trench Per Ft - 5	0 00	CB	Cobbly	1	1
Backhoe Trench Per Ft - 100	0 00	Trench Per Ft - 100	0 00	CB-C	Cobbly & Clay	1	1
Backhoe Trench Per Ft - 200	0 00	Trench Per Ft - 200	0 00	CB-CL	Cobbly & Clay Loam	1	1
Backhoe Trench Per Ft - 650	0 00	Trench Per Ft - 650	0 00	CB-COSL	Cobbly & Coarse Sandy Loam	1	1
Backhoe Trench Per Ft - 850	0 00	Trench Per Ft - 850	0 00	CB-FS	Cobbly & Fine Sand	1 1	1
Backhoe Trench Per Ft - 2550	0 00	Trench Per Ft - 2550	0 00	CB-FSL	Cobbly & Fine Sandy Loam	1 1	1
Backhoe Trench Per Ft - 5000	0 00	Trench Per Ft - 5000	0 00	CB-L	Cobbly & Loamy	1	1
Backhoe Trench Per Ft -10000	0 00	Trench Per Ft -10000	0 00	CB-LCOS	Cobbly & Loamy coarseSand	1	1
Hand Trench Fraction - 0	0 00	Backhoe Trench Fraction - 0	0 00	CB-LS	Cobbly & Loamy Sand	1	1
Hand Trench Fraction - 5	0 00	Backhoe Trench Fraction - 5	0 00	CB-S	Cobbly & Sand	1 1	1
Hand Trench Fraction - 100	0 00	Backhoe Trench Fraction - 100	0 00	CB-SCL	Cobbly & Sandy Clay Loam	1	1
Hand Trench Fraction - 200	0 00	Backhoe Trench Fraction - 200	0 00	CB-SICL	Cobbly & Silty Clay Loam	1	1
Hand Trench Fraction - 650	0 00	Backhoe Trench Fraction - 650	0 00	CB-SIL	Cobbly & Silt Loam	1	1
Hand Trench Fraction - 850	0 00	Backhoe Trench Fraction - 850	0 00	CB-SL	Cobbly & Sandy Loam	1 1	1
Hand Trench Fraction - 2550	0 00	Backhoe Trench Fraction - 2550	0 00	CBA	Angular Cobbly	1	1
Hand Trench Fraction - 5000	0 00	Backhoe Trench Fraction - 5000	0 00	CBA-FSL	Angular Cobbly & Fine Sandy Loam	1 1	1
Hand Trench Fraction -10000	0 00	Backhoe Trench Fraction -10000	0 00	CBV	Very Cobbly	1 2	1
Hand Trench Per Ft - 0	0 00	Backhoe Trench Per Ft - 0	0 00	CBV-C	Very Cobbly & Clay	1 2	1
Hand Trench Per Ft - 5	0 00	Backhoe Trench Per Ft - 5	0 00	CBV-CL	Very Cobbly & Clay Loam	1 2	1
Hand Trench Per Ft - 100	0 00	Backhoe Trench Per Ft - 100	0 00	CBV-FSL	Very Cobbly & Fine Sandy Loam	1 2	1
Hand Trench Per Ft - 200	0 00	Backhoe Trench Per Ft - 200	0 00	CBV-L	Very Cobbly & Loamy	1 2	1
Hand Trench Per Ft - 650	0 00	Backhoe Trench Per Ft - 650	0 00	CBV-LFS	Very Cobbly & Fine Loamy Sand	1 2	1
Hand Trench Per Ft - 850	0 00	Backhoe Trench Per Ft - 850	0 00	CBV-LS	Very Cobbly & Loamy Sand	1 2	1
Hand Trench Per Ft - 2550	0 00	Backhoe Trench Per Ft - 2550	0 00	CBV-MUCK	Very Cobbly & Muck	1 2	1
Hand Trench Per Ft - 5000	0 00	Backhoe Trench Per Ft - 5000	0 00	CBV-SCL	Very Cobbly & Sandy Clay Loam	1 2	1
Hand Trench Per Ft -10000	0 00	Backhoe Trench Per Ft -10000	0 00	CBV-SIL	Very Cobbly & Silt	1 2	1
Cut/Restore Asphalt Fraction - 0	0 00	Hand Trench Fraction - 0	0 00	CBV-SL	Very Cobbly & Sandy Loam	1 2	1
Cut/Restore Asphalt Fraction - 5	0 00	Hand Trench Fraction - 5	0 00	CBV-VFS	Very Cobbly & Very Fine Sand	1 2	1
Cut/Restore Asphalt Fraction - 100	0 00	Hand Trench Fraction - 100	0 00	CBX	Extremely Cobbly	1 2	1
Cut/Restore Asphalt Fraction - 200	0 00	Hand Trench Fraction - 200	0 00	CBX-CL	Extremely Cobbly & Clay	1 2	1
Cut/Restore Asphalt Fraction - 650	0 00	Hand Trench Fraction - 650	0 00	CBX-L	Extremely Cobbly Loam	1 2	1
Cut/Restore Asphalt Fraction - 850	0 00	Hand Trench Fraction - 850	0 00	CBX-SIL	Extremely Cobbly & Silt	1 2	1
Cut/Restore Asphalt Fraction - 2550	0 00	Hand Trench Fraction - 2550	0 00	CBX-SL	Extremely Cobbly &Sandy Loam	1 2	1
Cut/Restore Asphalt Fraction - 5000	0 00	Hand Trench Fraction - 5000	0 00	CBX-VFSL	Extremely Cobbly Very Fine Sandy Loam	1 3	1
Cut/Restore Asphalt Fraction -10000	0 00	Hand Trench Fraction -10000	0 00	CE	Coprogenous Earth	1	1
Cut/Restore Asphalt Per Ft - 0	0 00	Hand Trench Per Ft - 0	0 00	CIND	Cinders	1	1
Cut/Restore Asphalt Per Ft - 5	0 00	Hand Trench Per Ft - 5	0 00	CL	Clay Loam	1	1
Cut/Restore Asphalt Per Ft - 100	0 00	Hand Trench Per Ft - 100	0 00	CM	Cemented	1 3	1
Cut/Restore Asphalt Per Ft - 200	0 00	Hand Trench Per Ft - 200	0 00	CN	Channery	1	1
Cut/Restore Asphalt Per Ft - 650	0 00	Hand Trench Per Ft - 650	0 00	CN-CL	Channery & Clay Loam	1	1
Cut/Restore Asphalt Per Ft - 850	0 00	Hand Trench Per Ft - 850	0 00	CN-FSL	Channery & Fine Sandy Loam	1 1	1
Cut/Restore Asphalt Per Ft - 2550	0 00	Hand Trench Per Ft - 2550	0 00	CN-L	Channery & Loam	1	1
Cut/Restore Asphalt Per Ft - 5000	0 00	Hand Trench Per Ft - 5000	0 00	CN-SICL	Channery & Silty Clay Loam	1	1
Cut/Restore Asphalt Per Ft -10000	0 00	Hand Trench Per Ft -10000	0 00	CN-SIL	Channery & Silty Loam	1	1
Cut/Restore Concrete Fraction - 0	0 00	Bore Cable Fraction - 0	0 00	CN-SL	Channery & Sandy Loam	1	1
Cut/Restore Concrete Fraction - 5	0 00	Bore Cable Fraction - 5	0 00	CNV	Very Channery	1	1
Cut/Restore Concrete Fraction - 100	0 00	Bore Cable Fraction - 100	0 00	CNV CL	Very Channery & Clay	1	1
[illegible]	[illegible]	Bore Cable Fraction - 200	0 00	CNV L	Very Channery & Loam	1	1
				[illegible]	Channery & Sandy Clay Loam	1	

Underground Excavation/Restoration	Current Scenario Value
Cut/Restore Concrete Fraction - 5000	0 00
Cut/Restore Concrete Fraction -10000	0 00
Cut/Restore Concrete Per Ft - 0	0 00
Cut/Restore Concrete Per Ft - 5	0 00
Cut/Restore Concrete Per Ft - 100	0 00
Cut/Restore Concrete Per Ft - 200	0 00
Cut/Restore Concrete Per Ft - 650	0 00
Cut/Restore Concrete Per Ft - 850	0 00
Cut/Restore Concrete Per Ft - 2550	0 00
Cut/Restore Concrete Per Ft - 5000	0 00
Cut/Restore Concrete Per Ft -10000	0 00
Cut/Restore Sod Fraction - 0	0 00
Cut/Restore Sod Fraction - 5	0 00
Cut/Restore Sod Fraction - 100	0 00
Cut/Restore Sod Fraction - 200	0 00
Cut/Restore Sod Fraction - 650	0 00
Cut/Restore Sod Fraction - 850	0 00
Cut/Restore Sod Fraction - 2550	0 00
Cut/Restore Sod Fraction - 5000	0 00
Cut/Restore Sod Fraction -10000	0 00
Cut/Restore Sod Per Ft - 0	0 00
Cut/Restore Sod Per Ft - 5	0 00
Cut/Restore Sod Per Ft - 100	0 00
Cut/Restore Sod Per Ft - 200	0 00
Cut/Restore Sod Per Ft - 650	0 00
Cut/Restore Sod Per Ft - 850	0 00
Cut/Restore Sod Per Ft - 2550	0 00
Cut/Restore Sod Per Ft - 5000	0 00
Cut/Restore Sod Per Ft -10000	0 00
Pavement Stabilization Per Ft - 0	0 00
Pavement Stabilization Per Ft - 5	0 00
Pavement Stabilization Per Ft - 100	0 00
Pavement Stabilization Per Ft - 200	0 00
Pavement Stabilization Per Ft - 650	0 00
Pavement Stabilization Per Ft - 850	0 00
Pavement Stabilization Per Ft - 2550	0 00
Pavement Stabilization Per Ft - 5000	0 00
Pavement Stabilization Per Ft -10000	0 00
Dirt Stabilization Per Ft - 0	0 00
Dirt Stabilization Per Ft - 5	0 00
Dirt Stabilization Per Ft - 100	0 00
Dirt Stabilization Per Ft - 200	0 00
Dirt Stabilization Per Ft - 650	0 00
Dirt Stabilization Per Ft - 850	0 00
Dirt Stabilization Per Ft - 2550	0 00
Dirt Stabilization Per Ft - 5000	0 00
Dirt Stabilization Per Ft -10000	0 00
Simple Backfill - 0	0 00
Simple Backfill - 5	0 00
Simple Backfill - 100	0 00
Simple Backfill - 200	0 00
Simple Backfill - 650	0 00
Simple Backfill - 850	0 00
Simple Backfill - 2550	0 00
Simple Backfill - 5000	0 00
Simple Backfill -10000	0 00

Buried Excavation/Restoration	Current Scenario Value
Bore Cable Fraction - 5000	0 00
Bore Cable Fraction -10000	0 00
Bore Cable Per Ft - 0	0 00
Bore Cable Per Ft - 5	0 00
Bore Cable Per Ft - 100	0 00
Bore Cable Per Ft - 200	0 00
Bore Cable Per Ft - 650	0 00
Bore Cable Per Ft - 850	0 00
Bore Cable Per Ft - 2550	0 00
Bore Cable Per Ft - 5000	0 00
Bore Cable Per Ft -10000	0 00
Push Pipe/Pull Cable Fraction - 0	0 00
Push Pipe/Pull Cable Fraction - 5	0 00
Push Pipe/Pull Cable Fraction - 100	0 00
Push Pipe/Pull Cable Fraction - 200	0 00
Push Pipe/Pull Cable Fraction - 650	0 00
Push Pipe/Pull Cable Fraction - 850	0 00
Push Pipe/Pull Cable Fraction - 2550	0 00
Push Pipe/Pull Cable Fraction - 5000	0 00
Push Pipe/Pull Cable Fraction -10000	0 00
Push Pipe/Pull Cable Per Ft - 0	0 00
Push Pipe/Pull Cable Per Ft - 5	0 00
Push Pipe/Pull Cable Per Ft - 100	0 00
Push Pipe/Pull Cable Per Ft - 200	0 00
Push Pipe/Pull Cable Per Ft - 650	0 00
Push Pipe/Pull Cable Per Ft - 850	0 00
Push Pipe/Pull Cable Per Ft - 2550	0 00
Push Pipe/Pull Cable Per Ft - 5000	0 00
Push Pipe/Pull Cable Per Ft -10000	0 00
Cut/Restore Asphalt Fraction - 0	0 00
Cut/Restore Asphalt Fraction - 5	0 00
Cut/Restore Asphalt Fraction - 100	0 00
Cut/Restore Asphalt Fraction - 200	0 00
Cut/Restore Asphalt Fraction - 650	0 00
Cut/Restore Asphalt Fraction - 850	0 00
Cut/Restore Asphalt Fraction - 2550	0 00
Cut/Restore Asphalt Fraction - 5000	0 00
Cut/Restore Asphalt Fraction -10000	0 00
Cut/Restore Asphalt Per Ft - 0	0 00
Cut/Restore Asphalt Per Ft - 5	0 00
Cut/Restore Asphalt Per Ft - 100	0 00
Cut/Restore Asphalt Per Ft - 200	0 00
Cut/Restore Asphalt Per Ft - 650	0 00
Cut/Restore Asphalt Per Ft - 850	0 00
Cut/Restore Asphalt Per Ft - 2550	0 00
Cut/Restore Asphalt Per Ft - 5000	0 00
Cut/Restore Asphalt Per Ft -10000	0 00
Cut/Restore Concrete Fraction - 0	0 00
Cut/Restore Concrete Fraction - 5	0 00
Cut/Restore Concrete Fraction - 100	0 00
Cut/Restore Concrete Fraction - 200	0 00
Cut/Restore Concrete Fraction - 650	0 00
Cut/Restore Concrete Fraction - 850	0 00
Cut/Restore Concrete Fraction - 2550	0 00
Cut/Restore Concrete Fraction - 5000	0 00
Cut/Restore Concrete Fraction -10000	0 00
Cut/Restore Concrete Per Ft - 0	0 00
Cut/Restore Concrete Per Ft - 5	0 00
Cut/Restore Concrete Per Ft - 100	0 00
Cut/Restore Concrete Per Ft - 200	0 00
Cut/Restore Concrete Per Ft - 650	0 00
Cut/Restore Concrete Per Ft - 850	0 00
Cut/Restore Concrete Per Ft - 2550	0 00
Cut/Restore Concrete Per Ft - 5000	0 00
Cut/Restore Concrete Per Ft -10000	0 00
Cut/Restore Sod Fraction 0	0 00
Cut/Restore Sod Fraction - 5	0 00
[illegible]	0 00

[illegible]		Effect	fraction of CBG
CNX	Extremely Channery	1	1
CNX-SL	Extremely Channery & Sandy Loam	1	1
COS	Coarse Sand	1	1
COSL	Coarse Sandy Loam	1	1
CR	Cherty	1 2	1
CR-L	Cherty & Loam	1 2	1
CR-SICL	Cherty & Silty Clay Loam	1 2	1
CR-SIL	Cherty & Silty Loam	1 2	1
CR-SL	Cherty & Sandy Loam	1 2	1
CRC	Coarse Cherty	1 2	1
CRV	Very Cherty	1 2	1
CRV-L	Very Cherty & Loam	1 2	1
CRV-SIL	Very Cherty & Silty Loam	1 2	1
CRX	Extremely Cherty	1 3	1
CRX-SIL	Extremely Cherty & Silty Loam	1 3	1
DE	Diatomaceous Earth	1	1
FB	Fibric Material	1	1
FINE	Fine	1	1
FL	Flaggy	1	1
FL-FSL	Flaggy & Fine Sandy Loam	1 1	1
FL-L	Flaggy & Loam	1	1
FL-SIC	Flaggy & Silty Clay	1	1
FL-SICL	Flaggy & Silty Clay Loam	1	1
FL-SIL	Flaggy & Silty Loam	1	1
FL-SL	Flaggy & Sandy Loam	1	1
FLV	Very Flaggy	1 1	1
FLV-COSL	Very Flaggy & Coarse Sandy Loam	1 1	1
FLV-L	Very Flaggy & Loam	1 1	1
FLV-SICL	Very Flaggy & Silty Clay Loam	1 1	1
FLV-SL	Very Flaggy & Sandy Loam	1 1	1
FLX	Extremely Flaggy	1 1	1
FLX-L	Extremely Flaggy & Loamy	1 1	1
FRAG	Fragmental Material	1	1
FS	Fine Sand	1 1	1
FSL	Fine Sandy Loam	1 1	1
G	Gravel	1	1
GR	Gravelly	1	1
GR-C	Gravel & Clay	1	1
GR-CL	Gravel & Clay Loam	1	1
GR-COS	Gravel & Coarse Sand	1	1
GR-COSL	Gravel & Coarse Sandy Loam	1	1
GR-FS	Gravel & Fine Sand	1	1
GR-FSL	Gravel & Fine Sandy Loam	1	1
GR-L	Gravel & Loam	1	1
GR-LCOS	Gravel & Loamy Coarse Sand	1	1
GR-LFS	Gravel & Loamy Fine Sand	1 1	1
GR-LS	Gravel & Loamy Sand	1	1
GR-MUCK	Gravel & Muck	1	1
GR-S	Gravel & Sand	1	1
GR-SCL	Gravel & Sandy Clay Loam	1	1
GR-SIC	Gravel & Silty Clay	1	1
GR-SICL	Gravel & Silty Clay Loam	1	1
GR-SIL	Gravel & Silty Loam	1	1
GR-SL	Gravel & Sandy Loam	1	1
GR-VFSL	Gravel & Very Fine Sandy Loam	1 1	1
GRC	Coarse Gravelly	1	1
GRF	Fine Gravel	1	1
GRF-SIL	Fine Gravel Silty Loam	1	1
GRV	Very Gravelly	1	1
GRV-CL	Very gravelly & Clay Loam	1	1
GRV-COS	Very Gravelly & coarse Sand	1	1
GRV-COSL	Very Gravelly & coarse Sandy Loam	1	1
GRV-FSL	Very Gravelly & Fine Sandy Loam	1	1
GRV-L	Very Gravelly & Loam	1	1
GRV-LCOS	Very Gravelly & Loamy Coarse Sand	1	1
GRV-LS	Very Gravelly & Loamy Sand	1	1
GRV-S	Very Gravelly & Sand	1	1
GRV-SCL	Very Gravelly & Sandy Clay Loam	1	1

[illegible] Excavation/Restoration	Current Scenario Value

Buried Excavation/Restoration	Current Scenario Value
Cut/Restore Sod Fraction - 850	0.00
Cut/Restore Sod Fraction - 2550	0.00
Cut/Restore Sod Fraction - 5000	0.00
Cut/Restore Sod Fraction - 10000	0.00
Cut/Restore Sod Per Ft - 0	0.00
Cut/Restore Sod Per Ft - 5	0.00
Cut/Restore Sod Per Ft - 100	0.00
Cut/Restore Sod Per Ft - 200	0.00
Cut/Restore Sod Per Ft - 650	0.00
Cut/Restore Sod Per Ft - 850	0.00
Cut/Restore Sod Per Ft - 2550	0.00
Cut/Restore Sod Per Ft - 5000	0.00
Cut/Restore Sod Per Ft - 10000	0.00
Restoration Not Required - 0	0.00
Restoration Not Required - 5	0.00
Restoration Not Required - 100	0.00
Restoration Not Required - 200	0.00
Restoration Not Required - 650	0.00
Restoration Not Required - 850	0.00
Restoration Not Required - 2550	0.00
Restoration Not Required - 5000	0.00
Restoration Not Required - 10000	0.00
Simple Backfill - 0	0.00
Simple Backfill - 5	0.00
Simple Backfill - 100	0.00
Simple Backfill - 200	0.00
Simple Backfill - 650	0.00
Simple Backfill - 850	0.00
Simple Backfill - 2550	0.00
Simple Backfill - 5000	0.00
Simple Backfill - 10000	0.00

[illegible]		[illegible]	fraction of CBG
GRV-SL	Very Gravelly & Sandy Loam	1	1
GRV-VFS	Very Gravelly & Very Fine Sand	1	1
GRV-VFSL	Very Gravelly & Very Fine Sandy Loam	1	1
GRX	Extremely Gravelly	1.1	1
GRX-CL	Extremely Gravelly & Coarse Loam	1.1	1
GRX-COS	Extremely Gravelly & Coarse Sand	1.1	1
GRX-COSL	Extremely Gravelly & Coarse Sandy Loam	1.1	1
GRX-FSL	Extremely Gravelly & Fine Sand Loam	1.1	1
GRX-L	Extremely Gravelly & Loam	1.1	1
GRX-LCOS	Extremely Gravelly & Loamy Coarse	1.1	1
GRX-LS	Extremely Gravelly & Loamy Sand	1.1	1
GRX-S	Extremely Gravelly & Sand	1.1	1
GRX-SIL	Extremely Gravelly & Silty Loam	1.1	1
GRX-SL	Extremely Gravelly & Sandy Loam	1.1	1
GYP	Gypsiferous Material	1.2	1
HM	Hemic Material	1	1
ICE	Ice or Frozen Soil	1.5	1
IND	Indurated	1.2	1
L	Loam	1	1
LCOS	Loamy Coarse Sand	1	1
LFS	Loamy Fine Sand	1.1	1
LS	Loamy Sand	1	1
LVFS	Loamy Very Fine Sand	1	1
MARL	Marl	1	1
MEDIUM	Medium Coarse	1	1
MK	Mucky	1	1
MK-C	Mucky Clay	1	1
MK-CL	Mucky Clay Loam	1	1
MK-FS	Muck & Fine Sand	1	1
MK-FSL	Muck & Fine Sandy Loam	1	1
MK-L	Mucky Loam	1	1
MK-LFS	Mucky Loamy Fine Sand	1	1
MK-LS	Mucky Loamy Sand	1	1
MK-S	Muck & Sand	1	1
MK-SI	Mucky & Silty	1	1
MK-SICL	Mucky & Silty Clay Loam	1	1
MK-SIL	Mucky Silt	1	1
MK-SL	Mucky & Sandy Loam	1	1
MK-VFSL	Mucky & Very Fine Sandy Loam	1	1
MPT	Mucky Peat	1	1
MUCK	Muck	1	1
PEAT	Peat	1	1
PT	Peaty	1	1
RB	Rubbly	1.5	1
RB-FSL	Rubbly Fine Sandy Loam	1.5	1
S	Sand	1	1
SC	Sandy Clay	1	1
SCL	Sandy Clay Loam	1	1
SG	Sand & Gravel	1	1
SH	Shaly	1	1
SH-CL	Shaly & Clay	1	1
SH-L	Shale & Loam	1	1
SH-SICL	Shaly & Silty Clay Loam	1	1
SH-SIL	Shaly & Silt Loam	1	1
SHV	Very Shaly	1.5	1
SHV-CL	Very Shaly & Clay Loam	1.5	1
SHX	Extremely Shaly	2	1
SI	Silt	1	1
SIC	Silty Clay	1	1
SICL	Silty Clay Loam	1	1
SIL	Silt Loam	1	1
SL	Sandy Loam	1	1
SP	Sapric Material	1	1
SR	Stratified	1	1
ST	Stony	1	1
ST-C	Stony & Clay	1	1
ST-CL	Stony & Clay Loam	1	1

[illegible] Excavation/Restoration	Current Scenario Value	Buried Excavation/Restoration	Current Scenario	[illegible]	[illegible]	[illegible]	fraction of CSS
				ST-LCOS	Stony & Loamy Coarse Sand	1	1
				ST-LFS	Stony & Loamy Fine Sand	1 1	1
				ST-LS	Stony & Loamy Sand	1	1
				ST-SIC	Stony & Silty Clay	1	1
				ST-SICL	Stony & Silty Clay Loam	1	1
				ST-SIL	Stony & Silt Loam	1	1
				ST-SL	Stony & Sandy Loam	1	1
				ST-VFSL	Stony & Sandy Very Fine Silty Loam	1 1	1
				STV	Very Stony	1 2	1
				STV-C	Very Stony & Clay	1 2	1
				STV-CL	Very Stony & Clay Loam	1 2	1
				STV-FSL	Very Stony & Fine Sandy Loam	1 2	1
				STV-L	Very Stony & Loamy	1 2	1
				STV-LFS	Very Stony & Loamy Fine Sand	1 2	1
				STV-LS	Very Stony & Loamy Sand	1 2	1
				STV-MPT	Very Stony & Mucky Peat	1 2	1
				STV-MUCK	Very Stony & Muck	1 2	1
				STV-SICL	Very Stony & Silty Clay Loam	1 2	1
				STV-SIL	Very Stony & Silty Loam	1 2	1
				STV-SL	Very Stony & Sandy Loam	1 2	1
				STV-VFSL	Very Stony & Very Fine Sandy Loam	1 2	1
				STX	Extremely Stony	1 3	1
				STX-C	Extremely Stony & Clay	1 3	1
				STX-CL	Extremely Stony & Clay Loam	1 3	1
				STX-COS	Extremely Stony & Coarse Sand	1 3	1
				STX-COSL	Extremely Stony & Coarse Sand Loam	1 3	1
				STX-FSL	Extremely Stony & Fine Sandy Loam	1 3	1
				STX-L	Extremely Stony & Loamy	1 3	1
				STX-LCOS	Extremely Stony & Loamy Coarse Sand	1 3	1
				STX-LS	Extremely Stony & Loamy Sand	1 3	1
				STX-MUCK	Extremely Stony & Muck	1 3	1
				STX-SIC	Extremely Stony & Silty Clay	1 3	1
				STX-SICL	Extremely Stony & Silty Clay Loam	1 3	1
				STX-SIL	Extremely Stony & Silty Loam	1 3	1
				STX-SL	Extremely Stony & Sandy Loam	1 3	1
				STX-VFSL	Extremely Stony & Very Fine Sandy Loam	1 3	1
				SY	Slaty	3	1
				SY-L	Slaty & Loam	3	1
				SY-SIL	Slaty & Silty Loam	3	1
				SYV	Very Slaty	3 5	1
				SYX	Extremely Slaty	4	1
				UNK	Unknown	1	1
				UWB	Unweathered Bedrock	2	1
				VAR	Variable	1	1
				VFS	Very Fine Sand	1	1
				VFSL	Very Fine Sandy loam	1	1
				WB	Weathered Bedrock	3	1

[illegible]	Current Scenario Value
Regional Labor Adjustment Factor	1
Contractor excavation and restoration	1
Telco construction -- copper	1
Telco construction -- fiber	1
Telco drop/NID installation and maintenance	1
Contractor pole setting	1

Distribution [illegible]	Current Scenario Value		Feeder Input	Current Scenario Value		Switching [illegible]	Current Scenario Value		Expense Input	Current Scenario Value	

NRRI paper coefficients used in Staff's submission

all expressed per 1000 ft

[redacted]

buried optical	36 58		56 44	121 88	593 3			1850 1	2316 3		
buried copper	11 39		-1101 28	229 66	1349			1932 86	2427 9		
aerial optical	39 05		948 29						1100 81		477 [illegible]
aerial copper	9 42	1361 59	-120 32								
underground optical	34 73	2120 41	14 61								
underground copper	10 14	3568 45	-2064 74								
poles (expressed per pole)		310 65		112 55		66 08	49 99				

HAI Model Release 5.0NV - Expense Module

Wire Center Level Calculations UNE Costs Staff Run for Nevada Bell

clli	[illegible]	[illegible]	[illegible]	[illegible]	EQ Switching [illegible] Unit	EQ Switching [illegible]	Signaling [illegible]	Signaling [illegible]	[illegible]	[illegible]	[illegible]	Dedicated [illegible]	Dedicated Transmission Unit Cost [illegible]	Direct Transport Unit Cost per minute	Direct Transmission Unit Cost	Common Transport Unit Cost per minute per leg	Common Transmission Unit Cost per minute	Tandem Switching Unit Cost
AUSTNV11	$ 218.86	$ 0.54	$ 66.00	$ 44.82	$ 1.32	$ 0.00148	$ 0.00025	$ 0.00178	$ 10,219.29	$ 1,124.60	$ 0.11196	$ 3.31	$ 0.00033	$ 0.21838	$ 0.00000	$ 0.11196	$ 0.00029	$ 0.00220
BAKRNV11	$ 272.38	$ 0.52	$ 87.26	$ 16.87	$ 3.68	$ 0.00400	$ 0.00035	$ 0.00172	$ 19,003.72	$ 809.58694	$ 0.08060	$ 9.77	$ 0.00097	$ 0.26020	$ 0.00000	$ 0.08060	$ [illegible]	$ [illegible]
BTMTNV11	$ 17.95	$ 0.45	$ 7.81	$ 24.13	$ 3.64	$ 0.00366	$ 0.00019	$ 0.00166	$ 458.88	$ 259.96868	$ 0.02588	$ 21.98	$ 0.00219	$ 0.03377	$ 0.00000	$ 0.02587	$ [illegible]	$ [illegible]
BTMTNV12	$ 177.19	$ 0.54	$ 59.50	$ 361.33	$ 3.84	$ 0.00430	$ 0.00040	$ 0.00177	$ 30,017.93	$ 802.19346	$ 0.07986	$ 5.30	$ 0.00053	$ 0.28710	$ 0.00000	$ 0.07986	$ [illegible]	$ [illegible]
BTTYNV12	$ 41.33	$ 0.54	$ 13.69	$ 49.29	$ 5.47	$ 0.00613	$ 0.00023	$ 0.00182	$ 1,727.79	$ 290.56002	$ 0.02893	$ 42.35	$ 0.00422	$ 0.04595	$ 0.00000	$ 0.02893	$ 0.00417	$ [illegible]
CHBTNV11	$ 28.15	$ 0.52	$ 5.93	$ 10.42	$ 1.34	$ 0.00146	$ 0.00024	$ 0.00184	$ 520.41	$ 81.55569	$ 0.00812	$ 13.46	$ 0.00134	$ 0.01313	$ 0.00000	$ 0.00812	$ 0.00131	$ 0.00201
CRCYNV01	$ 6.38	$ 0.42	$ 2.34	$ 3.56	$ 1.48	$ 0.00141	$ 0.00021	$ 0.00186	$ 2.87	$ 4.58460	$ 0.00046	$ 8.55	$ 0.00085	$ 0.00076	$ 0.00002	$ 0.00046	$ 0.00084	$ 0.00173
CSTVNV11	$ 78.80	$ 0.53	$ 27.67	$ 39.31	$ 3.66	$ 0.00410	$ 0.00027	$ 0.00179	$ 6,434.54	$ 509.70620	$ 0.05075	$ 9.34	$ 0.00093	$ 0.10907	$ 0.00000	$ 0.05074	$ 0.00089	$ 0.00211
DKWRNV11	$ 421.63	$ 0.54	$ 135.49	$ 36.84	$ 3.68	$ 0.00413	$ 0.00037	$ 0.00177	$ 22,839.09	$ 882.00360	$ 0.08781	$ 10.33	$ 0.00103	$ 0.28213	$ 0.00000	$ 0.08781	$ 0.00101	$ 0.00312
DYTNNV11	$ 25.12	$ 0.47	$ 4.79	$ 19.80	$ 1.35	$ 0.00139	$ 0.00021	$ 0.00183	$ 16.00	$ 9.92076	$ 0.00099	$ 9.96	$ 0.00099	$ 0.00116	$ 0.00000	$ 0.00099	$ 0.00098	$ 0.00161
ELY NV01	$ 23.92	$ 0.44	$ 6.39	$ 9.60	$ 3.54	$ 0.00341	$ 0.00019	$ 0.00162	$ 213.08	$ 174.60817	$ 0.01738	$ 16.03	$ 0.00160	$ 0.02630	$ 0.00000	$ 0.01737	$ 0.00158	$ 0.00154
EMPRNV11	$ 38.13	$ 0.53	$ 20.70	$ 205.40	$ 1.50	$ 0.00168	$ 0.00027	$ 0.00178	$ 9,091.59	$ 657.05174	$ 0.06541	$ 4.22	$ 0.00042	$ 0.13872	$ 0.00000	$ 0.06541	$ 0.00039	$ 0.00234
EURKNV11	$ 54.36	$ 0.53	$ 16.35	$ 51.58	$ 3.52	$ 0.00395	$ 0.00024	$ 0.00181	$ 1,920.72	$ 293.17009	$ 0.02919	$ 22.36	$ 0.00223	$ 0.04812	$ 0.00000	$ 0.02919	$ 0.00218	$ 0.00201
FLVYNV12	$ 108.00	$ 0.53	$ 42.33	$ 79.93	$ 5.03	$ 0.00564	$ 0.00032	$ 0.00178	$ 15,235.97	$ 704.85202	$ 0.07017	$ 13.63	$ 0.00136	$ 0.19826	$ 0.00000	$ 0.07017	$ 0.00133	$ [illegible]
FRNLNV11	$ 16.64	$ 0.48	$ 4.04	$ 8.25	$ 1.37	$ 0.00141	$ 0.00022	$ 0.00188	$ 28.02	$ 16.97986	$ 0.00169	$ 7.96	$ 0.00079	$ 0.00199	$ 0.00000	$ 0.00169	$ 0.00077	$ 0.00167
GABBNV11	$ 148.78	$ 0.53	$ 45.32	$ 160.85	$ 5.02	$ 0.00563	$ 0.00032	$ 0.00178	$ 13,900.13	$ 635.48136	$ 0.06327	$ 13.63	$ 0.00136	$ 0.18037	$ 0.00000	$ 0.06327	$ 0.00133	$ 0.00284
HWTHNV11	$ 11.43	$ 0.54	$ 3.34	$ 13.76	$ 4.98	$ 0.00558	$ 0.00022	$ 0.00184	$ 1,071.41	$ 503.39297	$ 0.05012	$ 53.57	$ 0.00533	$ 0.07818	$ 0.00000	$ 0.05010	$ 0.00529	$ 0.00188
IMLYNV12	$ 87.59	$ 0.53	$ 44.40	$ 321.11	$ 1.93	$ 0.00216	$ 0.00027	$ 0.00178	$ 5,103.31	$ 388.40409	$ 0.03867	$ 3.07	$ 0.00031	$ 0.08340	$ 0.00000	$ 0.03867	$ 0.00027	$ [illegible]
INSPNV12	$ 13.27	$ 0.54	$ 4.44	$ 3.06	$ 5.53	$ 0.00620	$ 0.00025	$ 0.00182	$ 3,165.54	$ 463.53411	$ 0.04615	$ 36.56	$ 0.00364	$ 0.08346	$ 0.00000	$ 0.04614	$ 0.00360	$ 0.00218
INVGNV11	$ 6.89	$ 0.42	$ 2.31	$ 3.02	$ 1.49	$ 0.00142	$ 0.00021	$ 0.00188	$ 3.32	$ 3.94382	$ 0.00039	$ 11.18	$ 0.00111	$ 0.00044	$ 0.00000	$ 0.00039	$ 0.00110	$ 0.00163
LCWDNV11	$ 18.25	$ 0.52	$ 0.94	$ 5.69	$ 1.35	$ 0.00148	$ 0.00025	$ 0.00185	$ 1,013.60	$ 156.70789	$ 0.01560	$ 8.34	$ 0.00083	$ 0.02788	$ 0.00000	$ 0.01560	$ 0.00079	$ 0.00211
LTWLNV13	$ 51.63	$ 0.52	$ 13.48	$ 37.52	$ 5.43	$ 0.00596	$ 0.00024	$ 0.00174	$ 5,685.56	$ 790.07912	$ 0.07866	$ 37.50	$ 0.00373	$ 0.33650	$ 0.00000	$ 0.07865	$ 0.00372	$ 0.00288
LUNDNV12	$ 155.04	$ 0.54	$ 53.18	$ 189.76	$ 3.63	$ 0.00407	$ 0.00033	$ 0.00178	$ 14,423.01	$ 612.91164	$ 0.06102	$ 11.65	$ 0.00116	$ 0.17675	$ 0.00000	$ 0.06102	$ 0.00113	$ 0.00296
LVLCNV11	$ 32.72	$ 0.53	$ 8.91	$ 14.58	$ 1.33	$ 0.00148	$ 0.00022	$ 0.00183	$ 1,211.11	$ 433.30315	$ 0.04314	$ 5.17	$ 0.00051	$ 0.05518	$ 0.00000	$ 0.04313	$ 0.00046	$ 0.00180
MCGLNV11	$ 118.91	$ 0.53	$ 40.45	$ 15.46	$ 3.51	$ 0.00394	$ 0.00024	$ 0.00180	$ 2,596.98	$ 376.89589	$ 0.03752	$ 20.77	$ 0.00207	$ 0.06591	$ 0.00000	$ 0.03752	$ 0.00202	$ [illegible]
MINANV11	$ 172.87	$ 0.54	$ 53.01	$ 36.90	$ 5.02	$ 0.00563	$ 0.00032	$ 0.00177	$ 15,071.91	$ 780.25923	$ 0.07768	$ 13.75	$ 0.00137	$ 0.21732	$ 0.00000	$ 0.07768	$ 0.00134	$ 0.00296
PHRMNV11	$ 24.09	$ 0.54	$ 4.27	$ 8.64	$ 1.64	$ 0.00183	$ 0.00022	$ 0.00196	$ 116.73	$ 105.12123	$ 0.01047	$ 5.66	$ 0.00056	$ 0.01174	$ 0.00000	$ 0.01046	$ 0.00050	$ 0.00168
RENONV02	$ 4.91	$ 0.40	$ 1.95	$ 3.32	$ 1.51	$ 0.00139	$ 0.00021	$ 0.00189	$ 0.23	$ 0.44353	$ 0.00004	$ 7.85	$ 0.00078	$ 0.00007	$ 0.00005	$ 0.00004	$ 0.00077	$ 0.00171
RENONV12	$ 6.54	$ 0.49	$ 2.24	$ 3.09	$ 1.67	$ 0.00177	$ 0.00024	$ 0.00211	$ 6.26	$ 7.48081	$ 0.00074	$ 10.12	$ 0.00101	$ 0.00088	$ 0.00000	$ 0.00074	$ 0.00098	$ 0.00163
RENONV13	$ 4.96	$ 0.44	$ 2.15	$ 3.15	$ 1.52	$ 0.00148	$ 0.00022	$ 0.00197	$ 7.90	$ 13.23416	$ 0.00132	$ 5.18	$ 0.00052	$ 0.00148	$ 0.00001	$ 0.00132	$ 0.00050	$ 0.00167
RENONV14	$ 9.64	$ 0.47	$ 3.76	$ 3.01	$ 1.40	$ 0.00143	$ 0.00022	$ 0.00198	$ 2.47	$ 2.59018	$ 0.00026	$ 11.87	$ 0.00118	$ 0.00029	$ 0.00000	$ 0.00026	$ 0.00116	$ 0.00170
RENONV15	$ 7.58	$ 0.39	$ 3.97	$ 3.58	$ 1.44	$ 0.00129	$ 0.00020	$ 0.00173	$ 11.72	$ 9.30993	$ 0.00093	$ 5.17	$ 0.00051	$ 0.00107	$ 0.00000	$ 0.00093	$ 0.00050	$ 0.00151
RNMTNV11	$ 61.56	$ 0.53	$ 24.74	$ 86.80	$ 1.29	$ 0.00145	$ 0.00023	$ 0.00179	$ 4,476.25	$ 702.78064	$ 0.06997	$ 4.09	$ 0.00041	$ 0.11379	$ 0.00000	$ 0.06997	$ 0.00036	$ 0.00198
SCRZNV11	$ 72.68	$ 0.54	$ 22.37	$ 37.43	$ 4.98	$ 0.00558	$ 0.00028	$ 0.00179	$ 7,566.99	$ 592.59915	$ 0.05900	$ 17.87	$ 0.00178	$ 0.13071	$ 0.00000	$ 0.05900	$ 0.00175	$ [illegible]
SDVYNV11	$ 12.44	$ 0.54	$ 8.30	$ 33.34	$ 8.23	$ 0.00923	$ 0.00024	$ 0.00181	$ 3,400.97	$ 491.58092	$ 0.04894	$ 31.59	$ 0.00315	$ 0.08279	$ 0.00000	$ 0.04894	$ 0.00310	$ 0.00208
SNVYNV11	$ 11.46	$ 0.51	$ 3.28	$ 4.94	$ 1.38	$ 0.00149	$ 0.00023	$ 0.00205	$ 5.73	$ 4.80741	$ 0.00048	$ 15.64	$ 0.00156	$ 0.00054	$ 0.00000	$ 0.00048	$ 0.00152	$ 0.00177
SPRKNV11	$ 5.27	$ 0.43	$ 2.33	$ 3.62	$ 1.48	$ 0.00143	$ 0.00022	$ 0.00191	$ 5.37	$ 9.29568	$ 0.00093	$ 6.94	$ 0.00069	$ 0.00123	$ 0.00002	$ 0.00092	$ 0.00068	$ [illegible]
SPRKNV12	$ 6.82	$ 0.51	$ 2.44	$ 3.32	$ 1.42	$ 0.00156	$ 0.00025	$ 0.00215	$ 20.50	$ 11.85956	$ 0.00118	$ 19.07	$ 0.00190	$ 0.00139	$ 0.00000	$ 0.00118	$ 0.00185	$ 0.00194
STEDNV11	$ 11.54	$ 0.48	$ 3.26	$ 3.08	$ 1.38	$ 0.00143	$ 0.00022	$ 0.00198	$ 2.50	$ 2.59491	$ 0.00026	$ 11.90	$ 0.00119	$ 0.00029	$ 0.00000	$ 0.00026	$ 0.00116	$ 0.00170
SVSPNV11	$ 26.26	$ 0.50	$ 5.19	$ 10.27	$ 1.36	$ 0.00147	$ 0.00022	$ 0.00186	$ 164.00	$ 51.10812	$ 0.00509	$ 9.77	$ 0.00097	$ 0.00649	$ 0.00000	$ 0.00509	$ 0.00094	$ 0.00180
VERDNV11	$ 16.84	$ 0.51	$ 5.67	$ 9.98	$ 1.51	$ 0.00166	$ 0.00022	$ 0.00186	$ 550.76	$ 195.51359	$ 0.01946	$ 6.34	$ 0.00063	$ 0.02438	$ 0.00000	$ 0.01946	$ 0.00059	$ 0.00180
VRCYNV12	$ 18.54	$ 0.53	$ 4.19	$ 4.70	$ 1.41	$ 0.00158	$ 0.00024	$ 0.00197	$ 279.29	$ 69.66921	$ 0.00694	$ 19.03	$ 0.00189	$ 0.00952	$ 0.00000	$ 0.00694	$ 0.00184	$ 0.00190
WASONV11	$ 20.30	$ 0.48	$ 4.03	$ 5.79	$ 1.37	$ 0.00145	$ 0.00022	$ 0.00191	$ 27.65	$ 16.10810	$ 0.00160	$ 14.85	$ 0.00148	$ 0.00188	$ 0.00000	$ 0.00160	$ 0.00145	$ 0.00171
WNMCNV01	$ 15.98	$ 0.48	$ 4.45	$ 6.90	$ 2.00	$ 0.00203	$ 0.00021	$ 0.00182	$ 46.95	$ 38.95895	$ 0.00388	$ 12.16	$ 0.00121	$ 0.00436	$ 0.00000	$ 0.00388	$ 0.00116	$ 0.00163

Attachment LB-4
Testimony of Dr. Blank
Docket No. 98-6004

UNE LOOP COSTS FOR NEVADA BELL

	PUCN Staff Run				Nevada Bell Run			
clli	Distribution Unit Cost	Concentrator Unit Cost	Feeder Unit Cost	Total Loop Cost	Distribution Unit Cost	Concentrator Unit Cost	Feeder Unit Cost	Total Loop Cost
AUSTNV11	$ 218.86	$ 66.00	$ 44.82	$ 329.68	$ 687.58	$ 162.49	$ 84.73	$ 934.80
BAKRNV11	$ 272.38	$ 87.26	$ 16.87	$ 376.51	$ 840.22	$ 224.15	$ 45.35	$ 1,109.72
BTMTNV11	$ 17.95	$ 7.81	$ 24.13	$ 49.89	$ 50.74	$ 21.76	$ 51.59	$ 124.08
BTMTNV12	$ 177.19	$ 59.50	$ 361.33	$ 598.02	$ 553.38	$ 149.41	$ 665.13	$ 1,367.91
BTTYNV12	$ 41.33	$ 13.69	$ 49.29	$ 104.31	$ 116.88	$ 37.86	$ 91.43	$ 246.17
CHBTNV11	$ 28.15	$ 5.93	$ 10.42	$ 44.51	$ 61.20	$ 17.95	$ 30.78	$ 109.93
CRCYNV01	$ 6.38	$ 2.34	$ 3.56	$ 12.28	$ 18.60	$ 6.83	$ 6.67	$ 32.10
CSTVNV11	$ 78.80	$ 27.67	$ 39.31	$ 145.78	$ 240.11	$ 71.49	$ 90.98	$ 402.58
DKWRNV11	$ 421.63	$ 135.49	$ 36.84	$ 593.96	$ 1,318.35	$ 341.42	$ 83.77	$ 1,743.54
DYTNNV11	$ 25.12	$ 4.79	$ 19.80	$ 49.70	$ 59.83	$ 13.73	$ 37.53	$ 111.09
ELY NV01	$ 23.92	$ 6.39	$ 9.60	$ 39.91	$ 69.89	$ 19.08	$ 18.16	$ 107.12
EMPRNV11	$ 38.13	$ 20.70	$ 205.40	$ 264.23	$ 108.56	$ 69.05	$ 367.02	$ 544.64
EURKNV11	$ 54.36	$ 16.35	$ 51.58	$ 122.29	$ 160.37	$ 42.80	$ 98.04	$ 301.22
FLVYNV12	$ 108.00	$ 42.33	$ 79.93	$ 230.26	$ 332.92	$ 104.29	$ 151.90	$ 589.10
FRNLNV11	$ 16.84	$ 4.04	$ 8.25	$ 29.14	$ 40.35	$ 13.16	$ 15.56	$ 69.08
GABBNV11	$ 148.78	$ 45.32	$ 160.85	$ 354.94	$ 470.78	$ 118.46	$ 299.13	$ 888.37
HWTHNV11	$ 11.43	$ 3.34	$ 13.76	$ 28.54	$ 32.23	$ 9.37	$ 25.44	$ 67.04
IMLYNV12	$ 87.59	$ 44.40	$ 321.11	$ 453.10	$ 267.53	$ 127.69	$ 589.13	$ 984.35
INSPNV12	$ 13.27	$ 4.44	$ 3.06	$ 20.78	$ 33.74	$ 10.34	$ 6.10	$ 50.18
INVGNV11	$ 6.89	$ 2.31	$ 3.02	$ 12.23	$ 17.86	$ 6.82	$ 5.66	$ 30.34
LCWDNV11	$ 16.25	$ 0.94	$ 5.69	$ 22.89	$ 39.58	$ 11.83	$ 5.26	$ 56.68
LTWLNV13	$ 51.63	$ 13.48	$ 37.52	$ 102.63	$ 154.36	$ 38.91	$ 80.84	$ 274.12
LUNDNV12	$ 155.04	$ 53.18	$ 189.76	$ 397.99	$ 478.89	$ 145.45	$ 337.31	$ 961.65
LVLCNV11	$ 32.72	$ 8.91	$ 14.58	$ 56.21	$ 99.80	$ 24.17	$ 31.17	$ 155.13
MCGLNV11	$ 118.91	$ 40.45	$ 15.46	$ 174.82	$ 365.00	$ 99.01	$ 27.20	$ 491.21
MINANV11	$ 172.87	$ 53.01	$ 36.90	$ 262.77	$ 541.64	$ 131.91	$ 83.44	$ 756.99
PHRMNV11	$ 24.09	$ 4.27	$ 8.64	$ 37.00	$ 58.23	$ 10.73	$ 18.92	$ 87.89
RENONV02	$ 4.91	$ 1.95	$ 3.32	$ 10.18	$ 16.26	$ 5.47	$ 6.54	$ 28.28
RENONV12	$ 6.54	$ 2.24	$ 3.09	$ 11.87	$ 18.92	$ 6.36	$ 6.85	$ 32.13

Attachment LB-4
Testimony of Dr. Blank
Docket No. 98-6004

RENONV13	$	4.96	$	2.15	$	3.15	$	10.26	$	16.21	$	6.01	$	6.01	$	28.22
RENONV14	$	9.64	$	3.76	$	3.01	$	16.42	$	22.87	$	10.13	$	7.18	$	40.18
RENONV15	$	7.58	$	3.97	$	3.58	$	15.13	$	18.86	$	10.50	$	10.27	$	39.63
RNMTNV11	$	61.56	$	24.74	$	86.80	$	173.11	$	188.41	$	73.24	$	174.12	$	435.78
SCRZNV11	$	72.68	$	22.37	$	37.43	$	132.48	$	219.42	$	65.08	$	86.10	$	370.60
SDVYNV11	$	12.44	$	8.30	$	33.34	$	54.08	$	36.72	$	18.67	$	60.02	$	115.42
SNVYNV11	$	11.46	$	3.28	$	4.94	$	19.68	$	27.49	$	10.34	$	10.59	$	48.43
SPRKNV11	$	5.27	$	2.33	$	3.62	$	11.22	$	18.54	$	6.51	$	6.94	$	31.99
SPRKNV12	$	6.82	$	2.44	$	3.32	$	12.59	$	20.93	$	8.32	$	5.72	$	34.97
STEDNV11	$	11.54	$	3.26	$	3.08	$	17.88	$	26.58	$	9.64	$	6.85	$	43.07
SVSPNV11	$	26.26	$	5.19	$	10.27	$	41.72	$	56.93	$	15.93	$	25.10	$	97.97
VERDNV11	$	16.84	$	5.67	$	9.98	$	32.49	$	44.31	$	14.15	$	19.18	$	77.65
VRCYNV12	$	18.54	$	4.19	$	4.70	$	27.43	$	41.10	$	10.71	$	9.73	$	61.55
WASONV11	$	20.30	$	4.03	$	5.79	$	30.13	$	42.52	$	9.94	$	11.01	$	63.47
WNMCNV01	$	15.96	$	4.45	$	6.90	$	27.31	$	42.26	$	11.81	$	14.31	$	68.38

ROR COMPARISON ON LOOP COSTS FOR NEVADA BELL

clli	Staff Run at 11.25% ROR Total Loop Cost		Staff Run at 9.29% ROR Total Loop Cost		9.29% ROR run minus 11.25% ROR run	
AUSTNV11	$	329.68	$	291.71	$	(37.97)
BAKRNV11	$	376.51	$	334.00	$	(42.51)
BTMTNV11	$	49.89	$	43.77	$	(6.12)
BTMTNV12	$	598.02	$	520.84	$	(77.18)
BTTYNV12	$	104.31	$	91.43	$	(12.89)
CHBTNV11	$	44.51	$	39.29	$	(5.22)
CRCYNV01	$	12.28	$	10.98	$	(1.30)
CSTVNV11	$	145.78	$	128.52	$	(17.26)
DKWRNV11	$	593.96	$	526.68	$	(67.27)
DYTNNV11	$	49.70	$	43.61	$	(6.10)
ELY NV01	$	39.91	$	35.34	$	(4.58)
EMPRNV11	$	264.23	$	229.08	$	(35.15)
EURKNV11	$	122.29	$	107.36	$	(14.93)
FLVYNV12	$	230.26	$	202.41	$	(27.85)
FRNLNV11	$	29.14	$	25.82	$	(3.32)
GABBNV11	$	354.94	$	310.83	$	(44.11)
HWTHNV11	$	28.54	$	25.11	$	(3.43)
IMLYNV12	$	453.10	$	393.66	$	(59.44)
INSPNV12	$	20.78	$	18.57	$	(2.21)
INVGNV11	$	12.23	$	10.96	$	(1.27)
LCWDNV11	$	22.89	$	20.40	$	(2.49)
LTWLNV13	$	102.63	$	90.20	$	(12.44)
LUNDNV12	$	397.99	$	348.16	$	(49.82)
LVLCNV11	$	56.21	$	49.66	$	(6.55)
MCGLNV11	$	174.82	$	154.88	$	(19.95)
MINANV11	$	262.77	$	232.41	$	(30.36)
PHRMNV11	$	37.00	$	32.71	$	(4.30)
RENONV02	$	10.18	$	9.13	$	(1.05)
RENONV12	$	11.87	$	10.64	$	(1.23)
RENONV13	$	10.26	$	9.21	$	(1.05)
RENONV14	$	16.42	$	14.67	$	(1.75)
RENONV15	$	15.13	$	13.50	$	(1.63)
RNMTNV11	$	173.11	$	151.54	$	(21.57)
SCRZNV11	$	132.48	$	116.73	$	(15.75)
SDVYNV11	$	54.08	$	47.34	$	(6.74)
SNVYNV11	$	19.68	$	17.49	$	(2.19)
SPRKNV11	$	11.22	$	10.04	$	(1.18)
SPRKNV12	$	12.59	$	11.28	$	(1.31)
STEDNV11	$	17.88	$	15.96	$	(1.92)
SVSPNV11	$	41.72	$	36.84	$	(4.88)
VERDNV11	$	32.49	$	28.73	$	(3.76)
VRCYNV12	$	27.43	$	24.37	$	(3.05)
WASONV11	$	30.13	$	26.72	$	(3.41)
WNMCNV01	$	27.31	$	24.27	$	(3.05)

AFFIRMATION

STATE OF NEVADA)
: ss.
CARSON CITY)

LARRY BLANK, being first duly sworn, deposes and says:

That he is the person identified in the Prepared Testimony on file in Docket No. 98-6004, and the exhibits applicable to his Prepared Testimony; that such Testimony and exhibits were prepared by or under his direction; that the answers and information set forth therein are true to the best of his own knowledge and belief; and that if asked the questions set forth therein, his answers thereto would, under oath, be the same.

LARRY BLANK

SUBSCRIBED and SWORN to before
me this 1st day of July, 1998.

Notary Public

TINA MARIE ROBERTS
NOTARY PUBLIC - NEVADA
Appt. Recorded in CARSON CITY
My Appt. Exp. March 27, 1999

PROOF OF SERVICE

I hereby certify that I have this day served the foregoing Testimony of Larry Blank. in Docket No. 98-6004. upon all Parties of Record in the proceeding by delivering to the Nevada Department of Administration copies thereof. properly addressed. for mailing to the following:

James Riley
NEVADA BELL
P.O. Box 11010
Reno. NV 89520

John W. Bogy, Esq.
NEVADA BELL
P.O. Box 11010
Reno. NV 89520

Michael Hurst. Esq.
AT&T COMMUNICATIONS
795 Folsom Street, Room 670
San Francisco. CA 94107

James T. Endres
AT&T COMMUNICATIONS
5250 S. Virginia St.
Reno, NV 89502

John Frankovich. Esq.
McDONALD. CARANO, et al.
241 Ridge Street, 4th Floor
Reno, NV 89520

Kent F. Heyman, General Counsel
Marilyn H. Ash, Assoc. Legal Counsel
MGC COMMUNICATIONS, INC.
3301 North Buffalo Drive
Las Vegas, NV 89129

Ann C. Pongracz, Esq.
SPRINT OF NEVADA
330 S. Valley View Blvd.
Las Vegas, NV 89152

Kim Dismukes
5688 Forsythia Avenue
Baton Rouge LA 70808

David Gabel
Scott Kennedy
GABEL COMMUNICATIONS
31 Stearbs Street
Newton Center, MA 02159

DATED at Carson City, Nevada, this 1st day of July, 1998.

Danielle L. Pence

Danielle L. Pence, an employee of the
Public Utilities Commission of Nevada

D:\DANIELLE\PROOFS\98-6004.POS

EXTRA

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS
100 Washington Square, Suite 1700
100 Washington Avenue South
Minneapolis, Minnesota 55401-2138

RECEIVED
AT&T Corp. Legal - Denver
PF 11/19
NOV 19 1998

OV-NIT	PRO SER
MESS	REG MAIL ✓
INTER-OF	FAX
OTHER	INITIALS PF

November 17, 1998

Dr. Burl W. Haar, Executive Secretary
Minnesota Public Utilities Commission
350 Metro Square Building
121 Seventh Place East
St. Paul, Minnesota 55101

RE: In the Matter of a Generic Investigation of U S West Communications, Inc.'s Cost of providing Interconnection and Unbundled Network Elements; OAH Docket No. 12-2500-10956-2.

Dear Dr. Haar:

Enclosed and served upon you is the Report of the Administrative Law Judge in the above-entitled matter. The official record will be sent to you under separate cover. We are now closing our file.

Sincerely,

Steve M. Mihalchick by lc

STEVE M. MIHALCHICK
Administrative Law Judge

Telephone: 612/349-2544

SMM:lc

Enclosure

cc: Attached Service List

SERVICE LIST as of November 17, 1998
OAH Docket No.12-2500-10956-2
MPUC Docket Nos. P-442, 5231, 3167, 466, 421/C1-96-1540

In the Matter of a Generic Investigation of U.S. West Communications, Inc.'s Cost of Providing Interconnection and Unbundled Network Elements

Burl W. Haar (15 copies)
Minnesota Public Utilities Commission
350 Metro Square Building
121 Seventh Place East
St. Paul, MN 55101
FAX: (612) 297-7073

Linda Chavez (4 copies)
Department of Public Service
Metro Square Building, Suite 200
121 Seventh Place East
St. Paul, MN 55101-2145
FAX: 297-1959

Steve M. Mihalchick
Administrative Law Judge
Office of Administrative Hearings
100 Washington Square, Suite 1700
Minneapolis, MN 55401-2138
(612)349-2544; FAX: (612)349-2665

Marc A. Fournier
Minnesota Public Utilities Commission
350 Metro Square Building
St. Paul, MN 55101
(612) 296-3793, FAX (612) 297-7073

Kevin J. Saville
US WEST, Inc.
200 South Fifth Street, Room 395
Minneapolis, MN 55402
(612)672-8927; FAX: (612)672-8911

Charles A. Hoffman
Maslon Edelman Borman & Brand LLP
3300 Norwest Center
90 South Seventh Street
Minneapolis, MN 55402-4140
(612)672-8368; FAX: 672-8397

Michel L. Singer
AT&T
1875 Lawrence Street, Suite 1575
Denver, CO 80202
(303)298-6527, FAX (303)298-6301

Joann Anderson
AT&T Communications of
the Midwest, Inc., 9th floor
901 Marquette Avenue
Minneapolis, MN 55402-3233

Ellen Gavin
J. Jeffrey Oxley
Assistant Attorneys General
445 Minnesota Street, Suite 1200
St. Paul, MN 55101-2130
(612)296-1483; FAX: (612)282-5437

Scott Wilensky
Eric F. Swanson
Assistant Attorneys General
445 Minnesota Street, Suite 1200
St. Paul, MN 55101-2130
(612)297-4609; FAX: (612)296-7438

Kristine L. Eiden
Hatch, Eiden & Pihlstrom
One Financial Plaza, Suite 850
120 South Sixth Street
Minneapolis, Minnesota 55402
(612)341-9457, FAX (612)341-9463

Gena M. Doyscher
Frontier Telemanagement, Inc.
1221 Nicollet Mall, Suite 300
Minneapolis, MN 55403
(612) 343-5678, FAX (612) 349-6232

Richard J. Johnson
Michael J. Bradley
Moss & Barnett
4800 Norwest Center
90 South Seventh Street
Minneapolis, MN 55402-4129
(612)347-0337, FAX (612)339-6686

Douglas W. Trabaris
Senior Regulatory Counsel
Teleport Communications Group Inc.
233 South Wacker Dr., Suite 2100
Chicago, IL 60606
(312) 705-9829, FAX (312) 705-9801

Karen L. Clauson
Senior Attorney
MCI Telecommunications Corporation
707 - 17th Street, Suite 3600
Denver, CO 80202
(303) 390-6655, FAX (303) 390-6333

Scott Brener
U S WEST Communications
200 south Fifth Street, Room 390
Minneapolis, MN 55402

Kathryn Sheffield
U S WEST, Inc.
1801 California Street, Suite 5100
Denver, CO 80202

William E. Flynn
Kimberly S. Freise
Lindquist & Vennum P.L.L.P.
4200 IDS Center
80 South Eighth Street
Minneapolis, MN 55402-2205.
(612) 371-3226, FAX (612) 371-3207

James M. Strommen
Daniel L. Greensweig
Kennedy & Graven, Chartered
470 Pillsbury Center
200 South Sixth Street
Minneapolis, MN 55402
(612)337-9233, FAX (612)337-9310

Michael J. Shortley, III
Frontier Corporation
180 South Clinton Ave
Rochester, NY 14646
(716) 777-1028, FAX (716) 546-7823

David L. Sasseville
Lindquist & Vennum P.L.L.P.
4200 IDS Center
80 South Eighth Street
Minneapolis, MN 55402-2205.
(612) 371-3229, FAX (612) 371-3207

OAH Docket No. 12-2500-10956-2
MPUC Docket No. P-442, 5231, 3167, 466, 421/C1-96-1540

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of a Generic Investigation of U S West Communications, Inc.'s Cost of Providing Interconnection and Unbundled Network Elements

REPORT OF THE
ADMINISTRATIVE LAW JUDGE

November 17, 1998

TABLE OF CONTENTS

OAH Docket No. 12-2500-10956-2
MPUC Docket No. P-442, 5231, 3167, 466, 421/C1-96-1540

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS

FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of a Generic Investigation of U S West Communications, Inc.'s Cost of Providing Interconnection and Unbundled Network Elements	REPORT OF THE ADMINISTRATIVE LAW JUDGE

The above-entitled matter came on for hearing before Administrative Law Judge Steve M. Mihalchick on April 20 – May 6, and July 22, 1998. The record was closed upon receipt of the final reply brief on August 31, 1998.

APPEARANCES

James Gallagher, Maun & Simon, 2000 Midwest Plaza Building West, 801 Nicollet Mall, Minneapolis, Minnesota 55402; Kevin J. Saville, Attorney, U S WEST Communications, Inc., 200 South Fifth Street, Room 395, Minneapolis, Minnesota 55402; Douglas N. Owens, Law Offices of Douglas N. Owens, 1325 Fourth Avenue, Suite 940, Seattle, Washington 98101, and John M. Devaney, Attorney at Law, 607 Fourteenth Street NW, Washington, DC 20005-2011 for U S WEST Communications, Inc.

Michel L. Singer, Attorney at Law, 1875 Lawrence Street, Suite 1575, Denver, Colorado 80202, for AT & T Communications of the Midwest, Inc.

Karen L. Clauson, Senior Attorney, MCI Telecommunications Corporation, 707 - 17th Street, Suite 3600, Denver, CO 80202 and Gregory R. Merz, Gray, Plant, Mooty, Mooty & Bennett, 3400 City Center, 33 South Sixth Street, Minneapolis, MN 55402, for MCIMetro Access Transmission Services, Inc.

Scott Wilensky and Joshua Wirtschafter, Assistant Attorneys General, 445 Minnesota Street, Suite 1200, St. Paul, MN 55101-2130 for the Office of the Attorney General, Residential Utility and Small Business Division.

J. Jeffrey Oxley and Ellen Gavin, Assistant Attorneys General, 445 Minnesota Street, Suite 1200, St. Paul, MN 55101-2130, for the Department of Public Service.

Michael J. Bradley, Moss & Barnett, 4800 Norwest Center, 90 South Seventh Street, Minneapolis, MN 55402-4129, for Minnesota Independent Coalition

Marc A. Fournier and Kevin O'Grady, Analysts, Minnesota Public Utilities Commission, 350 Metro Square Building, St. Paul, MN 55101, for the Commission staff.

Based upon the record herein, the Administrative Law Judges makes the following:

FINDINGS AND CONCLUSIONS

BACKGROUND

1. Section 251(c) of the Telecommunications Act of 1996 (Act) requires incumbent local exchange carriers (ILECs) to provide entrants with interconnection, access to unbundled network elements (UNEs), and collocation "on rates, terms and conditions that are just, reasonable and nondiscriminatory . . . ." Section 252(d) requires State commissions to set nondiscriminatory prices based on cost "without reference to a rate-of-return or other rate-based proceeding." These prices may include "a reasonable profit."

2. On December 2, 1996, the Minnesota Public Utilities Commission (Commission) issued an ORDER RESOLVING ARBITRATION ISSUES AND INITIATING A U S WEST COST PROCEEDING, Doc. Nos. P-442, 421/M-855, P-5321, 421/M-909, and P-3167, 421/M-729 (Consolidated Arbitration Order). That Order commenced this proceeding to establish the prices at which U S WEST Communications, Inc. (U S WEST) would provide interconnection, collocation, and unbundled network elements (UNEs). The Consolidated Arbitration Order also directed that this proceeding address the issues of deaveraging UNE prices on the basis of geographic cost differences, and temporally deaveraging call transport and call termination prices. At various places in the Consolidated Arbitration Order, the Commission indicated its approval of TELRIC (Total Element Long Run Incremental Cost) methodology for determining the various prices. [1]

3. By its NOTICE AND ORDER FOR HEARING of March 12, 1997, the Commission referred the proceeding to the Office of Administrative Hearings for hearing before an Administrative Law Judge (ALJ). The Commission specified that the proceeding was to investigate the costs of UNEs, unbundling, collocation, interconnection, access to operational support systems (OSS), call completion services, directory assistance, interim number portability, and such other issues as the ALJ determined were appropriate. In addition, the Commission directed the proceeding to consider both geographic and temporal deaveraging.

4. In 1997, the Legislature amended Minn. Stat. § 237.12 by adding subdivision 4. Subdivision 4 requires that prices for interconnection and network elements for telephone companies with more than 50,000 access lines be based on:

> a forward-looking economic cost methodology which shall include, but is not limited to, consideration of the following:

---

[1] See, e.g., Consolidated Arbitration Order at 61, n.9, 67, and 74.

(1)the use of the most efficient telecommunications technology currently available and the least cost network configuration, given the existing location of the incumbent telephone company's wire centers;

(2)forward-looking depreciation rates;

(3)a reasonable allocation of forward-looking joint and common costs;

(4)forward looking cost of capital; and

(5)Minnesota tax rates, and where applicable, Minnesota facility placement requirements, Minnesota topography, and Minnesota climate.

The amendment was effective May 31, 1997, and was made applicable to all matters pending as of that date. [2]

5. On October 22, 1998, the FCC adopted its Fifth Report and Order, ***In the Matter of Federal-State Joint Board on Universal Service Forward-Looking Mechanism for High Cost Support for Non-Rural LECs***, CC Dkt. Nos. 96-45 and 97-160 (Fifth Report and Order), adopting the model it will use for estimating forward-looking costs for the federal Universal Support mechanism. The federal platform will be a continually evolving model that is a blending of the HAI, BCPM, and the Hybrid Cost Proxy Model (HCPM) developed by its own staff. Some of the findings in the Fifth Report and Order are instructive and will be noted in this report.

THE UNE MODELS

THE RLCAP 4.0 MODEL

6. U S WEST filed 16 models in this proceeding covering outside plant, switching, interoffice transport, signaling, and operations.[3] Loop and drop wire investments are estimated by U S WEST's Regional Loop Cost Analysis Program (RLCAP) Version 4.0. [4] RLCAP has been updated and revised substantially over the course of this proceeding. U S WEST also offers the BCPM model and its results, but only as a "qualitative and quantitative check and balance" for the investment results of RLCAP.[5] The company does not suggest that BCPM be used to calculate the cost of UNEs because BCPM models "total service costs," not UNE costs.

---

2 Minn. Laws 1997, ch. 223, § 28.
3 Ex. 603 at 8-9.
4 Ex. 621 at 19; Ex. 122.
5 Tr. Vol. 6 at 79.

Overview

7. RLCAP calculates the investments for loop and drop wire by applying investments (developed from standard engineering loop designs) to loop lengths. [6] The number and estimated lengths of loops are the principal cost drivers in RLCAP. The number of working loops served by a switch determines the wire center group to which those loops belong. RLCAP models four wire center groups. The lengths of all loops belonging to each specific wire center group provides the length occurrence profile for that wire center group.

8. Loops of various lengths are associated with occurrences of different types of distribution areas. RLCAP uses five distribution area designs or density groups. These five designs are assigned occurrence probabilities at various loop intervals for each of the four wire center groups.

9. The costs of constructing each of the five density groups is divided by the number of working lines each design provides to yield a single average cost per line for each density group. To compute costs at the wire center level, each density group's average line costs are multiplied by the number of loops of each length interval as well as by the probability of the density group's occurrence at each loop length interval.

10. The construction of loop plant involves various direct material, equipment, and labor costs, such indirect expenses as sales taxes, shipping charges, and other expenses as well. Feeder plant costs are calculated on a per foot basis. Distribution costs are calculated on a "capacity unit" cost basis, "based on the service design criteria (or model) for an average loop. . . ." The unit of capacity is the loop. The capacity unit cost is the dollar cost of the expense divided by the number of loops to which the expense applies. [7]

11. Investments in distribution plant are modeled separately from investments in feeder plant. RLCAP employs five density groups. They range from a design intended to represent very densely populated urban settings with high concentrations of residential and business customers (DG1) to a design intended to represent very sparsely populated rural settings with few customers (DG5). These five designs are used to represent all the distribution areas in U S WEST's 14-state service territory.

12. Once total costs for each density group are estimated, the sum is divided by the assumed number of working lines in each group to determine average cost per line by density group. [8] The result is that each density group provides a single average cost for a working line and the model generates five average costs. These average costs are identical for every line in the same density group in every state in U S WEST's territory, except for small differences based solely on differences between the states in their mix of residential and business lines.

---

6 Ex. 264 (U S WEST cost studies) at 1.1.
7 *Id.* at 1.2.
8 Tr. Vol. 4 at 217-18.

13. The universe of wire centers is modeled as consisting of four different groups. Each of the four wire center groups is defined by a single variable: the number of working subscriber pairs. The very small wire center group consists of wire centers with fewer than 2,501 working pairs; the small group encompasses wire centers with 2,501 to 10,000 working pairs; the medium group range is 10,001 to 30,000 working pairs; and the large group range represents all wire centers with over 30,000 working pairs.

14. For each type of service and wire center group, RLCAP contains a loop length file. These files provide the percentages of loops of a given length in 1000 foot increments. [9] For example, three percent of all the loops in medium wire center groups may be between seven and eight kilofeet in length; five percent between eight and nine kilofeet; and four percent between nine and ten kilofeet. If five percent of all residential loops in medium wire centers are between eight and nine kilofeet in length, then the probability that any given residential loop in a medium wire center is between eight and nine kilofeet in length is .05.

15. In addition to the feeder length frequency files, RLCAP contains files that relate feeder lengths by wire center group to density group occurrences. [10] These files are based on the assumption that, for each wire center group, the probability that a distribution area corresponds to one of the five density group varies with the length of the feeder. The basic assumption is that the more dense distribution groups are less likely to occur, and the less dense groups are more likely to occur, as distance from the wire center increases. Across wire center groups, the more dense distribution designs occur more frequently as the wire center size increases and conversely with respect to the less dense distribution designs.

RLCAP's Weaknesses

Use of Embedded Data

16. The U S WEST models are basically "revamped" versions of their generic service cost models which they use to file for tariff rates for services like Touch Tone or Centrex.[11] They were updated in an attempt to comply with TELRIC requirements, but all the U S WEST models, and RLCAP in particular, heavily rely on embedded costs and structures and assumptions based on old data.

17. RLCAP is not well integrated with the other U S WEST models. Changes in one model's results due to alterations in input values or algorithms are not automatically captured in the other models. The fact that U S WEST's models are not tightly coupled allows for inconsistencies to develop across models, such as different line counts in RLCAP and SCM. [12]

---

9 *Id.*
10 *Id.* at 1.7-1.8.
11 Ex. 604 at 9.
12 Ex. 603 at 10; Tr. Vol. 8B at 61-62.

Unsupported Key Data

18. U S WEST has provided little support for the five distribution designs used in RLCAP. The same five designs are used in all fourteen of U S WEST's states. U S WEST has not offered any evidence that these designs do in fact correspond to actual distribution areas, much less that the five designs adequately represent all distribution areas in Minnesota. The designs might be the result of least-cost, forward-looking criteria, but they might not be.

19. RLCAP does not actually model any distribution areas or compute costs based on information about the distribution areas in which actual customer locations are found. RLCAP neither provides nor uses any information about distribution area boundaries or distribution area living units.

20. RLCAP does not attempt to model either actual or forward-looking distribution lengths in the "scorched node" context required for a TELRIC analysis. The model uses wire center group level feeder length files to measure the distances from the wire center to the serving areas interface (SAI). However, customers are actually located at various distances from SAIs. RLCAP's approach assumes that distribution lengths have the same fixed relationship to feeder lengths in every wire center in each wire center group. [13] Again, U S WEST provides no support for this assumption.

21. U S WEST obtained loop length data from several sources. Of the various potential data sources mentioned, the documentation does not reveal which sources were actually used. [14] Nor is there any discussion of how loop length information was actually estimated for inclusion in any of the sources of such data. The documentation does not indicate whether the loop length information is Minnesota specific, whether it is comprehensive or sampled information, nor how dated the information is.

22. According to U S WEST's response to DPS IR 0167, the Minnesota mechanized loop census was conducted in 1989. [15] In its reply to OAG information request 121, U S WEST stated that "[t]he only wire center loop length files available for Minnesota are the files currently in the RLCAP model. This data was collected in 1988." [16] U S WEST witness Mr. Buckley could not state whether all loops in Minnesota were equally likely to be represented in RLCAP data. He testified that "my gut feeling is that there probably is far better data in the higher populated or the more greatly populated wire centers, than where the data may be a little thin as in the low density areas." [17]

23. Department witness Mr. Legursky thought it likely that the data for the very large wire center group would be particularly inaccurate because "the data which does exist for the half of the loops in the large [wire center group] is skewed to newer feeder and distribution areas because the record data was entered into LFACS, LMOS and LEIS

---

13 Ex. 503A at 13.
14 Ex. 264 at 1.5.
15 Ex. 604, JWL-4 at 9.
16 Ex. 503B, GMM-1 at 39.
17 Tr. Vol. 4 at 223.

coincident with job completion." [18] Mr. Legursky further stated that "[t]he Mechanized Loop Census must be accepted; it cannot be verified. It is old and outdated. Yet, it is the key piece of data used in RLCAP." [19]

24. For each wire center group, there is a single profile of its density group composition. [20] There is, however, no support for this assumption. Nor is there any reason to believe that the density group profiles of wire centers should be the same across U S WEST's fourteen state region. For example, a medium size wire center in sparsely populated Wyoming might consist of higher proportions of the least dense density groups than a medium size wire center in more densely populated Minnesota.

25. U S WEST has offered no support for the values it has given to the occurrences of density groups at different feeder lengths across wire center groups. [21] The kilofiles in RLCAP, like the distribution designs, are the same across U S WEST's 14-state region. [22] U S WEST has provided no evidence that Minnesota's actual density characteristics match the kilofile representations.

No Estimates of the Cost of Serving Particular Areas

26. A critical failing of RLCAP with respect to determining UNE costs is that it does not attempt to estimate costs for specific distribution areas. [23] Whereas HAI constructs clusters based on actual locations of customers in Minnesota and then develops distribution costs based on the location of the cluster and its distance from the wire center, RLCAP uses no information about Minnesota customer locations or distribution areas. As previously noted, one set of dated and incomplete information provides RLCAP with information about feeder length occurrences by wire center group. Another set of files provides information about distribution group occurrences by distance intervals from the wire center. These data are unsupported. Both sets of data generate cost estimates at a very high level of aggregation, too high a level to be useful in geographically deaveraging costs. [24]

27. RLCAP is capable of "deaveraging" costs only to the wire center group level. The four wire center groups in RLCAP are associated with four average costs per line. The number of lines in a wire center determines the average cost of a loop in that wire center. [25] The model does not generate Minnesota-specific cost estimates and should not be used as the basis for Minnesota UNE prices. RLCAP simply produces a single average loop cost for each of its four wire center groups.

28. Using RLCAP, each one of U S WEST's fourteen states will have costs that consist of various mixes of these four average loop costs, depending on the mix of wire

---

18 Ex. 603 at 23.
19 Ex. 603 at 55.
20 Ex. 603 at 25-26.
21 Ex. 350 at 441.
22 Ex. 503A at 12.
23 Ex. 603 at 18.
24 Ex. 603 at 55.
25 Ex. 503A at 16.

center groups in each state and to a very minor extent, differences in the residential/business mix across states. The cost of a loop in a medium size wire center is the same regardless of whether that wire center is located in a rural, a suburban, or an urban area; or whether the soil is loamy or solid rock. [26] A related problem is that structure costs are not modeled based on actual soil or terrain characteristics of particular areas. The structure costs associated with a density group design in RLCAP are invariant with respect to location. A density group design is associated with certain fixed structure costs. [27]

29. U S WEST claims that "RLCAP calculates the investments for loop and drop wire by applying investments ...to loop lengths" (emphasis added). [28] That statement mischaracterizes what RLCAP does. As explained above, RLCAP does not use data on the complete loop length. Instead, those cost estimates are based on feeder lengths, and assumed distribution costs at different feeder lengths. This is a very important distinction in that feeder is a relatively small cost of the whole loop. The majority of the loop cost is the cost for the distribution plant which RLCAP assumes is always the same in all states, save for differences in state-specific input costs. [29]

30. Further, the kilofiles, which show the probability of each density group at various feeder distances from the wire center are the same in all of U S WEST's states. [30] All that varies across the states are the average lengths of feeder in each wire center group, the number of wire centers in each wire center group, and the weighting of the residential and business kilofiles.

31. RLCAP makes no use of geocoded data to locate customers. Nor do RLCAP's distribution area designs rely on census data. [31] The distribution designs were developed by several U S WEST engineers in 1988. [32] U S WEST has not provided any other support for these designs. The identical designs are used in each state in U S WEST's 14-state region. Both Department witness Mr. Legursky and OAG witness Mr. Morrisette testified that they were unable to determine from the information U S WEST provided whether the distribution designs were either reasonable or representative of Minnesota serving areas. [33]

32. These defects of RLCAP are structural. U S WEST has admitted that modifying the model to accommodate the measurement of costs for a specific wire center would involve a major redesign effort. [34]

---

26 Ex. 350 at 449-50; Tr. Vol. 4 at 242-43.
27 Tr. Vol. 4 at 279.
28 See Ex. 122 at 1.
29 Ex. 349 at 11-12.
30 Tr. Vol. 4 at 292-93.
31 Ex. 503A at 8.
32 Ex. 503B, OAG IR 113 and 122, GMM-1 at 19, 40.
33 Ex. 503A at 9-10; Ex. 603 at 18, 23.
34 Ex. 604, JWL-4 at 22.

Inconsistent with TELRIC Principles

33. Correct estimates of costs should have the numerator (the total increment of costs required to provide the element of concern) consistent with the denominator (the demand for the element to be provided with those facilities). U S WEST does not have a proper match of the numerator and denominator. As proposed by U S WEST, RLCAP 4.0 determines costs by placing enough distribution facilities to serve ultimate future demand but divides those costs by the current level of demand. In effect, this approach has today's ratepayers and competitors paying for loops used to provide service to future customers and competitors. With this mismatch, as the demand increases in the future, U S WEST would collect more revenue than the costs to provide the distribution facilities.[35]

34. DG5 is the distribution model U S WEST uses to compute the cost of loops used to serve farms, homes and business in rural areas (rural customers). With similar cable costs, the modification of DG5 from the previous version of RLCAP 3.5, RLCAP 4.0 increases loop costs computed for rural areas by more than 35%. Confidential Exhibit TMZ-3, Ex. 350 provides a comparison of the facilities and assumed number of customers served by DG5 in RLCAP 3.5 and RLCAP 4.0. In both versions of RLCAP, U S WEST assumed the exact same types and lengths of cables; thus, DG5 is assumed to provide service to the same size geographic area and has the same total costs for those facilities. But, in RLCAP 4.0, U S WEST assumed DG-5 will have fewer service drops and thus provides service to fewer customers.

35. This change in assumption increases costs substantially. DG5 has the same amount of cable in both versions 3.5 and 4.0. The sum of the costs of 50 pair buried cable, 25 pair buried cable, 25 pair aerial cable, 100 pair stub cable represent approximately 90% to 95% of the total distribution costs in DG5. When the number of rural customers assumed in RLCAP 3.5 is replaced with the assumed number of customers in RLCAP 4.0, the cost per loop for cable and cross connects increases by 40%. Assuming that the cost for the facilities did not change, then, the total cost per loop in rural areas would be approximately 35% higher than U S WEST computed with the assumption in RLCAP 3.5. By changing the "rural customer" assumption, RLCAP version 4.0 produces an increase in the investment cost of a rural loop of more than $750. [36]

36. The density group design approach artificially limits the economies of scale potentially achievable in a scorched node environment. For example, the largest size cable placed in any of RLCAP's density groups is 900 pair. [37] In contrast, HAI will place larger cables in distribution areas to capture economies of scale. Distribution plant design should permit the deployment of any equipment that is available provided that such equipment is least-cost and embodies forward-looking technology.

---

35 Ex. 349 at 16-17.
36 Ex. 349 at 12-13.
37 Ex. 350 at 445-46.

37. With regard to structure sharing, RLCAP assumes that developers will pay 20% of the costs of placing buried cable facilities in distribution areas and that when developers do not pay such costs, it will incur 100% of such placement costs. With respect to aerial cable, it has assumed that some entity other than U S WEST will pay half of the cost.

49. U S WEST assumed it could achieve more sharing in dockets in other states. For example in Oregon, U S WEST signed a Stipulation with OPUC Staff in which it agreed that it was reasonable to assume developers would pay 35% of the placement costs for buried cables and some entity other than U S WEST would pay 50% of pole costs. If it is reasonable to make those assumptions in Oregon, it should be assumed that U S WEST pays no more than 65% of buried placement costs and no more than 50% of pole costs in Minnesota.

38. In actuality, RLCAP does not compute either actual or forward-looking structure costs. Instead, RLCAP simply applies an average cost. Pole investment, for example, is calculated by multiplying the length of cable involved by the ratio of pole investment to aerial cable investment.[38] As Mr. Buckley explained, "what we do is develop the investment for the cable itself and then apply that ratio to develop the structure for it, the conduit system or the poles."[39] Thus, if a more expensive cable is installed, the associated structure cost rises in equal proportion.[40] The problem is that it is not evident that structure costs should increase in such situations. For example, there is no reason to suppose that a pole carrying a 200 pair cable should cost twice as much as a pole carrying a 100 pair cable. This modeling method is not sufficiently specific and, therefore, is not consistent with TELRIC principles.

39. Another example of the unreasonable rigidity deriving from RLCAP's methodology is the treatment of digital loop carrier (DLC). DLC is network transmission equipment that provides a pair gain function. "Pair gain" refers to the multiplexing of telephone conversations over a fewer number of physical facilities. DLC is available for both fiber and copper facilities. RLCAP deploys only a single type of fiber DLC system in the small, medium, and large wire center groups. In the very small wire center group, RLCAP uses a weighted average of DLC costs from two different vendors.[41] A TELRIC approach to modeling DLC would involve determining which configuration is least cost in each particular situation.

40. DPS witness Mr. Legursky's analysis of the sensitivity of RLCAP cost estimates to changes in its fill factors revealed that costs increased inexplicably as fill rose from 80% to 90%, and that, generally, as fill rose costs decreased much less than he expected.[42] Mr. Buckley admitted an error in RLCAP's calculation mechanism was

---

[38] Ex. 603 at 16.
[39] Tr. Vol. 4 at 252.
[40] Tr. Vol. 4 at 252.
[41] Ex. 603 at 17.
[42] Ex. 603 at 27.

responsible for the unexpected jump in costs at the 90% fill level. [43] However, Mr. Legursky's observation that costs should have decreased more than 3.51% as fill rose from 50% to 99% remains. [44]

41. Another problem with the RLCAP methodology is that it applies the same fill factor to both copper and fiber technology. Fiber DLC systems have higher fills because they can be installed in smaller increments of capacity than copper cables. [45] These failings too illustrate that RLCAP is not consistent with TELRIC principles.

42. Mr. Legursky also pointed out that RLCAP employs a longer planning period than U S WEST engineers use in actuality, five versus three years. RLCAP generates plant sufficient to meet growth over the next five years. According to Mr. Legursky, it "is unreasonable to assume a longer planning period for cost modeling purposes than what is actually used in reality." [46] Because RLCAP assumes a growth rate of loops "in excess of 4 percent" per year, the longer planning period increases the number of loops modeled by at least 8.16%. [47] The result is that RLCAP builds too much plant. A forward-looking network design would not be based on a planning period longer than that which is actually used.

43. U S WEST's witness Mr. Buckley states that comparison of RLCAP results to 1995 and 1996 U S WEST construction costs "provides evidence that U S WEST's cost studies produce reasonable, if not conservative, estimates of the cost of providing telecommunications services."[48] There is no reason to believe that U S WEST's actual construction costs are relevant. Mr. Buckley provides only two data points, 1995 and 1996 data, and they vary substantially in the per line cost. Further, Mr. Buckley provides no reason to suppose that U S WEST's actual construction costs involved representative loops that were constructed in least-cost fashion using forward looking technologies. OAG witness Morrisette testified these charges could not be fairly compared to RLCAP's estimated costs because there they were not properly adjusted to correct for the double counting of spare capacity and because they were not representative of all of U S WEST's loops.[49]

44. The centerpiece of RLCAP is its use of embedded lengths as a principal driver. Mr. Buckley defends the use of embedded loop length data in RLCAP by stating that:

> [t]he TELRIC scorched node parameters state that wire centers will be assumed to be where they are today. Customers and roadways will also remain where they are. Based on that alone, actual measured feeder lengths are the best representation of TELRIC feeder routes. HAI uses a geometric approach to approximate feeder lengths. This may be a reasonable surrogate, but it is not

---

43 Tr. Vol. 4 at 246-47.
44 Ex. 603 at 27.
45 Ex. 603 at 30.
46 Ex. 603 at 30.
47 Ex. 604, JWL-4 at 12.
48 Ex. 121 at 4.
49 Ex. 503A at 34.

better than actual data.[50]

There are a number of fallacies in U S WEST's argument. First, customer locations do change. U S WEST's telephone plant was constructed incrementally as growth occurred and as customer locations shifted. Thus, the telephone plant is not optimally designed. Second, technological developments change the characteristics of least-cost plant design over time. [51] A necessary consequence of technological development is that past embedded technologies and the network designs based on those technologies become outmoded. Third, RLCAP's uses feeder lengths from a dated and incomplete study whose results cannot be practically validated. [52] Since actual feeder lengths themselves are at best a surrogate for the lengths of feeder cables in a least-cost, forward looking network, RLCAP's kilofiles involve two layers of approximations.

45. Finally, and again, RLCAP does not use any actual distribution length data, it extrapolates from the feeder data. As Mr. Morrisette states, "[i]n essence, the model assumes that customers are distributed within a distribution area in exactly the same way SAIs are distributed within wire center groups. However, there is no support for the assumption that a distribution pattern exists between customers in a serving area and SAIs in a wire center group." [53] In summary, even if it were true that actual loop length data should be used in a TELRIC study, RLCAP would not comply because it only has partial data on a part of the loop.

46. The ALJ concludes that RLCAP does not qualify for serious consideration in this proceeding. It has not been shown to produce reliable, reasonable results. It cannot be used to calculate geographically deaveraged rates in a meaningful way. None of its major defects can be remedied easily. RLCAP is an unacceptable model for the purpose of determining UNE costs for U S WEST in Minnesota.

THE HAI MODEL

47. The HAI model is the only acceptable model offered in this proceeding for estimating the costs of UNEs. The only serious questions raised about HAI relate to its customer location and outside plant design methodologies. The Commission is familiar with the model from previous proceedings, so it will not be discussed in detail except to address significant issues and necessary adjustments.

Customer Location

48. HAI's preprocessing is performed at PNR. To the extent possible, it uses address data to create geocoded locations of customers within census blocks (CBs). HAI has geocoded location information for over seventy percent of Minnesota telephone

---

50 Ex. 124 at 16.
51 Tr. Vol. 4 at 263-66; Ex. 629.
52 Ex. 603 at 23.
53 Ex. 500 at 13.

subscribers.[54] The remaining customer locations for which no addresses are available must be estimated by a surrogate location methodology. (Other sources of geocoded customer information will become available over time. For example, utility companies can be expected to start accumulating geocoded information on customer locations.)

49. HAI assumes that non-geocoded customers are located an equal distance from each other on the exterior boundary of the census block.[55] This method produces the maximum distance between non-geocoded customers within each CB, but may create false clustering along shared boundaries. It has an element of reality in that CBs are often bounded by roads and customers are located along roads. The Census Bureau generally locates census block boundaries along populated roads to produce well-defined population areas.[56]

50. The BCPM produces surrogate locations (actually, all of its locations) by placing customers along roadways, excluding roadway types that are unlikely to have population along them. In the Fifth Report and Order, the FCC found HAI's use of geocoded customer locations preferable, but also found that a roadway methodology similar to the BCPM's would be better at placing non-geocoded customers than HAI's CB-border methodology.[57]

51. MCI and AT&T have indicated to the FCC and in this proceeding that its preprocessing routines can be modified to use a roadway methodology for surrogate placement. Based upon Mr. Legursky's description of the accuracy of the preprocessing module and Mr. Denney's testimony, it appears unlikely that such a modification would produce a significant change in loop costs.

52. Once all customer locations are established by either geocoded data or by the surrogate location methodology, the preprocessing module groups customers into clusters. The only restriction on the location of clusters is that they cannot cross a wire center boundary. They can, however, cross census block boundaries.[58]

53. The clustering algorithm groups customers together within certain constraints. No customer location may be more than 18,000 feet from the cluster's centroid, clusters may not contain more than 1800 lines, and no customer location may be more than two miles from its nearest neighbor in the cluster. *Id.* To efficiently perform clustering calculations, all customer locations are assumed to be at the center of 150 square foot cells. The clustering algorithm takes a cell and searches for neighboring cells containing customer locations. If a neighboring cell is populated, the algorithm determines whether any of the cluster constraints would be violated by adding the cell to the cluster. If not, the cell is added to the cluster and the search process is repeated. Once this process is completed, the algorithm runs again, but checks for populated

---

54 Ex. 634 at 953.
55 Ex. 315 at 30.
56 Tr. Vol. 9 at 129; Ex. 315 at 30.
57 Fifth Report and Order ¶¶ 26, 31-41.
58 Ex. 315 at 31.

neighboring cells within a two-cell distance from the initial cell. The algorithm continues to run, enlarging its search range each time, until no more cells can be added to the cluster without violating one of the constraints. *Id.* at 32.

54. The next step in the preprocessing involves chaining outlier clusters (those with four or fewer customers) to main clusters (those with more than four customers) so as to minimize the length of the chains. In addition, the algorithm rectangularizes each cluster about its centroid so that it has the same area and centroid as the convex hull of the cluster. *Id.* at 33. In designing distribution plant, the HAI assumes that the number of customers identified for each cluster are uniformly distributed throughout each cluster.

55. The FCC agrees that a clustering process must be used, but chose the clustering methodology proposed by its staff in the HCPM. It uses a technique of dividing up the wire center customers into clusters rather than building clusters of nearby customers. The FCC found that the HCPM methodology creates the least-cost groupings.[59]

Distribution Plant

56. The PNR cluster data is used by the HAI Model to design distribution and feeder plant. The actual and surrogate locations of the customers used to create the clusters is not passed to HAI, only the size and location of rectangularized representations of the clusters and the number of customers in each location. For each cluster in each wire center, HAI designs feeder plant from each wire center to the center of every cluster in the wire center and distribution plant from the center of each cluster to almost the edges of the cluster. It does this by dividing the total area of the cluster by the number of customers to determine the average area occupied by each resident, which it inaccurately calls an average "lot," then determines the average lot width and lot depth by applying a 2:1 ratio. The module then calculates the length of "backbone" distribution cables from the center point to the top and bottom edges of the cluster, minus the average lot depth. It next calculates the number of branches needed by dividing the height of the cluster by the average lot depth. Finally, it calculates the length of "branch" distribution cables from the backbone to the side of the cluster, less the average lot width. The distribution plant is the total length of the two backbone cables and the branches. The module then sizes and costs the required cable and equipment.[60] The process may be visualized as dividing each cluster into "lots" and then designing distribution along north-south and east-west lines to the nearest corners of the lots in the corners of the cluster, and then adding enough east-west branches to reach an inner corner of every other "lot" along the sides of the cluster. Thus, there is a branch reaching or passing by every "lot" in the cluster. The loops are completed by adding in the cost of the drops for every lot in the cluster and other required equipment and materials.

59 Fifth Report and Order, ¶¶ 47-53.
60 Ex. 315 (HAI Model Description), App. E.

57. In some clusters, HAI produces too little distribution plant. One factor that may lead to underestimating is that in low density clusters, the calculated average "lot" size is far larger than a typical lot, so the branches and drops won't reach the customers. In other cases, HAI produces too distribution plant. A factor that may lead to overestimating is that spreading customers evenly throughout the cluster means that the HAI designs distribution to cover every square inch of every cluster when, in fact, there is always subclustering of customers that makes that unnecessary. Another is that rectilinear design does not take advantage of opportunities to use shorter, more direct routes.

PNR Issues

58. U S West introduced several *ex parte* filings Sprint made with the FCC raising the issue of whether the HAI model estimated sufficient distribution plant to serve telephone subscribers in Nevada, particularly in the low density areas of the state.[61] The ALJ then issued orders permitting U S West and the Department to obtain certain customer location data from PNR to investigate whether Sprint's allegations applied to the HAI model's estimation of costs in Minnesota. Following preliminary analysis by U S WEST and the Department on the information obtained from PNR, the ALJ permitted the parties to file supplemental direct testimony and replies and further ordered a workshop session to explore the matter.

59. The information US WEST obtained during the visit to PNR included the minimum spanning tree (MST) distances connecting customer locations for each HAI cluster in Minnesota, the length of the diagonal of the minimum bounding rectangle for each cluster, and information identifying each cluster and its associated wire center.[62]

60. The MST distances were computed by a program developed by Stopwatch Maps. The MST is not the absolute minimum length of lines necessary to connect all customer locations within a cluster. It is actually a gauge of *dispersion* and is close to the minimum length of the lines necessary to connect all locations within an area without using additional connecting points. Because wireline telephone service must connect each customer to the telephone network, the MST distances could be a measure of the adequacy of the telephone cable lengths generated by the cost proxy models submitted in the case. However, the MST has never been used in that manner by telephone network engineers. Nevertheless, the FCC has chosen to use an MST technique as an optional method of designing distribution in its Universal Service platform.[63]

61. U S WEST expert witnesses Dr. Emmerson and Dr. Duffy-Deno testified that their study of the PNR data and MST distances revealed two "flaws" in the HAI model. The first involves "[t]he conversion of PNR's irregular polygons into equivalent area rectangles [that] effectively compresses the size of the serving area so that HAI 5.0a

---

61 Ex. 292-93.

62 Ex. 815 at 8.

63 Fifth Report and Order, ¶33.

underestimates the required amount of distribution distance." (Emphasis in original).[64] The second has to do with the division of the equivalent area rectangle into rectangular lots that are served with branch and backbone cable that does not extend to the rectangle's boundary but instead stops one lot's distance from the boundary. *Id.* For low density clusters, this second "flaw" results in telephone facilities being concentrated in the centers of the equivalent area rectangles.

62. Both of these criticisms of HAI distribution plant design methodology were based on information previously available to U S WEST or on information previously obtainable by U S WEST. Nothing of substance was gained at PNR by the US WEST witnesses.

63. The process of locating the vertices of the irregular polygons that are then converted into equivalent area rectangles, is discussed in the HAI documentation.[65] U S WEST could have requested more information about this process at any time.

64. The second "flaw" U S WEST "discovered" as a result of its visit to PNR was that the HAI model does not deploy distribution cable that touches the boundary of the equivalent area rectangle but instead stops one lot width from the boundary. This is exactly what the HAI documentation says the model does.[66] When U S WEST witness Mr. Copeland criticized the HAI model for deploying too little distribution plant in his March 23, 1998, prefiled testimony and his April 23, 1998, live testimony, he revealed a full understanding of that aspect of the model.[67] Neither U S WEST nor the Department learned anything new from their visit to PNR about how equivalent area rectangles were developed for use in the HAI model.

65. The additional evidence U S WEST produced could have been produced earlier had the company acted with reasonable diligence to obtain it. U S WEST claims the visit to PNR was necessary "to review the PNR clustering information."[68] However, U S WEST did not produce any new information about the clustering process as a result of its visit. U S WEST only made measurements they could have made previously had they asked to do so. Dr. Fitzsimmons' testimony on special access, in so far as it went beyond discussing the methodology for implementing Mr. Legursky's recommendation for counting special access lines differently in the feeder plant than the distribution plant, was also not new evidence. None of the evidence offered by U S WEST changed its advocacy before the ALJ and the Company made no new recommendations as a result of the evidence.

66. It was the occurrence of long, narrow, diagonal clusters in Nevada that caused the alleged HAI clustering distortions of which Sprint complained to the FCC and that formed the basis for U S WEST's request and the Administrative Law Judge's order

---

64 Ex. 815 at 5.
65 Ex. 315 at 33.
66 Ex. 315 at 42.
67 Ex. 168 at 2-6; Tr. Vol. 4, at 161-165.
68 Tr. ,Workshop, at 61.

allowing the parties to visit PNR to check for similar problems here. But, as Dr. Emmerson testified, the U S WEST experts found no "Nevada-type" clusters in Minnesota. What he found was that there was some difference in the dispersion between the PNR locations and the HAI cluster-assumed locations.[69] But, as Mr. Legursky testified, the additional evidence produce by the PNR visit is not "new" and certainly does nothing to discredit the HAI clustering and distribution design methodologies. On the contrary, the evidence from PNR and other evidence presented at the workshop following the PNR visit lend even further support to the conclusion that those methodologies are reasonably accurate and meet all relevant requirements. Mr. Legursky noted the apparent accuracy of the PNR methodologies. As discussed next, MCI and AT&T witnesses showed that HAI designs more than sufficient distribution when measured against any reasonable standard.

67. Because the evidence presented from the PNR visit weighs in favor of the HAI proponents, the ALJ finds no reason to exclude it in this proceeding. However, the ALJ recommends that the Commission deny US WEST's request for reconsideration in the Universal Service proceeding because there is no new evidence supporting US WEST's position on these issues.

68. US WEST argues that in all main clusters where the HAI model's distribution plus drop lengths fall below minimum spanning tree distances, the distribution cable plus drop lengths should be adjusted upward to at least equal the minimum spanning tree distances. They estimate that the incremental increase to the HAI estimate of the average monthly unbundled loop cost for U S WEST's entire serving area in Minnesota that would by caused by changing the distribution lengths to equal the minimum spanning trees would result in a $.79 upward adjustment to the cost of the unbundled loop generated by the HAI model, using the DPS proposed adjustments.[70]

69. Alternatively, and in response to questions raised by the ALJ at the July 22, 1998 workshop, U S WEST proposed modifying the HAI model so that the distribution area lot depth is set at a maximum of two times the drop lengths used by the HAI model to place distribution facilities.[71] In Dr. Fitzsimmons' view, such an adjustment would correct the HAI model's unrealistic compression of distribution facilities on the interior of the serving area rectangle and will result in the branch and distribution cable being placed closer to the outside boundary of rectangular serving area created by the HAI model.[72] In other words, branch and backbone cable would be moved out closer to the locations where the HAI model assumes the customers are located. As a result of this adjustment, in each of the HAI density zones, the maximum distance from the termination of the branch and backbone cable to the perimeter of the serving area

---

69 Tr., Workshop, at 63-64.
70 Ex. 816 at 8.
71 Tr., Workshop, at 152-53.
72 Tr., Workshop, at 152-53 and 186-191.

rectangle would be significantly reduced. Dr. Fitzsimmons has quantified the dollar value of this modification to be $1.15.[73]

70. ATT and MCI witnesses Mr. Denney and Mr. Pitkin demonstrated that, in fact, the HAI Model appropriately estimates the necessary cable to serve customers. Mr. Denney pointed out that the HAI Model estimates longer average loop lengths than both the BCPM and RLCAP. The HAI Model estimates a longer loop length for U S WEST as a whole and for the majority of density zones, including the first two density zones where U S WEST claims HAI's estimates are poor.[74] BCPM's distribution cable lengths tend to be shorter than those estimated in the HAI Model, and its feeder lengths tends to be longer. The best comparison between the two models is average total loop length. A comparison of these numbers shows that HAI models a longer loop length than does BCPM.[75]

71. Mr. Denney also compared the average loop lengths of RLCAP with those of HAI. RLCAP summarizes loop lengths by office size (very small, small, medium and large) and reports shorter average loop lengths than HAI for every office type. According to US WEST, RLCAP cost estimates are based on a sample of actual loop lengths.[76]

72. In adopting its Universal Service platform, the FCC decided that its model should make the best use of the customer location information by designing outside plant to those locations, rather than to evenly dispersed locations in each cluster. In its analysis, the FCC found that HAI, and BCPM to some extent, were likely to underestimate distribution in low density areas. It chose to use the HCPM methodology, which designs outside plant to within a few hundred feet of every actual or surrogate customer location.[77] Until the HCPM was proposed, no model had the ability to do such detailed design.

73. The ALJ concludes that the evidence in this record demonstrates that the HAI designs adequate outside plant and makes a reasonably accurate determination of loop costs on a wire center basis. The fact that some clusters may be low and some high provides additional argument that deaveraging below the wire center level should not be attempted. It does not mean that there should be one-sided adjustments to bring the low clusters up as U S WEST proposes. Therefore, the ALJ does not recommend either of U S WEST's proposed fixes. The Commission may wish to track the development of the FCC's distribution design methodology for future modifications of the Minnesota model, but it is necessary to proceed now with the available models to establish prices for UNEs so that competition can proceed.

---

73 *Id.* at 154.
74 Ex. 381 at 4-8.
75 Ex. 381 at 6.
76 Ex. 381 at 7.
77 *Fifth Report and Order*, ¶¶55-60.

Other Outside Plant Issues

74. The outside plant of a telephone network consists of the feeder cables that run from the wire center to a serving area interface, the distribution cables that run from the serving area interface to the block terminals or pedestals, and the drops that run from the block terminals to the network interface device, which in turn connects to the customer's inside wiring. These various cables may be buried, placed underground in conduit, or hung in the air from poles. The structure built for telephone plant may be shared with others. The set of percentages of the cabling (or fiber) that is buried, underground, or aerial is called the plant mix. The cost of placing facilities in the ground varies with ground conditions. Ground conditions vary according to the natural soil type, e.g., rocky or sandy, as well as with the structures people have placed upon or set into the ground, i.e., placing a cable under a road requires the road surface either be cut or bored under. Under certain ground conditions, aerial placement may be required.

75. In the FNPRM[78], the FCC provisionally concluded that the selected universal service model should permit both terrain factors and line density zones to factor into the determination of plant mix. Further, the FCC considered that relatively more feeder and distribution cable should be assigned to aerial installation for all population density groups in wire centers characterized by "hard rock" conditions that those in wire centers with other terrain conditions.[79] In addition, the FCC indicated its preference for a model that should similarly specify costs for installation of aerial cable, buried cable, and underground cable that incorporate terrain factors and line density zones.[80] The FCC also tentatively concluded that the selected model should specify costs per foot for conduit installation that vary by line density zone, that materials and installation costs should be separately identified by both density zone and terrain type, and that the model should define density zones based on the number of telephone lines per square mile.[81] Finally, the FCC tentatively concluded that the selected model should prescribe additional costs to account for additional expenses caused by difficult terrain.[82] The FCC indicated that a satisfactory model for estimating universal service costs would permit plant mix and installation costs to vary by ground conditions, whether of natural or human origin.

76. Because they encourage accuracy, these criteria for universal service cost proxy models are appropriate as well for cost models for UNEs, especially if the model will ever be required to compute geographically deaveraged costs. HAI's cost methodology fully comports with the FCC's recommendations.[83] HAI considers bedrock depth, rock hardness, surface soil type, and water depth in calculating placement costs. HAI

78 Further Notice of Proposed Rulemaking, CC Docket Nos. 96-45 and 97-160, July 18, 1997.
79 FNPRM, ¶ 58.
80 FNPRM, ¶ 65.
81 FNPRM, ¶ 67.
82 FNPRM, ¶¶ 36, 66.
83 Ex. 315 at 34.

assumes each serving area has the geological characteristics of the census block group into which it predominantly falls.[84] HAI permits installation costs to vary by density zone as well.[85]

77. U S WEST criticizes the HAI's maximum loop length assumption. U S WEST witness Mr. Schaaf claims that the maximum loop length should be limited to 12,000 feet and not extend to 18,000 feet as assumed in the HAI Model.

78. When DLC equipment is used, it adds resistance to the loop, which shortens the maximum loop length. With extended range cards, DLC will function with 26 gauge copper cables of up to 17,960 feet and with 24 gauge cables of up to 28,900 feet. The HAI model relies on extended range cards to deploy DLC equipment with 26 gauge copper loops of 18,000 feet.

79. The HAI model does not explicitly identify the loops that require extended range cards. Instead the HAI uses a card cost that represents a composite cost of a POTS card and an extended range card. As a general rule, the relative percentage of loops of a given length declines as length increases. With respect to long loops, it is therefore conservative to model loop occurrence as a constant across all distances up to the maximum 18,000 foot deployment of copper loop beyond the DLC permitted by the HAI model. Under this assumption, the percentage of loops that would require extended range cards is 12%. A standard card costs approximately $270. An extended range RUGV2 card costs 25% more or $337.50. HAI uses a composite card cost of $310.[86] If 12% of all loops required the RUGV2 card and the remaining 88% could use the POTS card, the average cost of necessary cards would be .12 x $337.50 + .88 x $270.00 = $40.50 + $237.6 = $278.10, well below the HAI composite card cost.

80. The FCC has concluded that its platform should assume a maximum copper loop length of 18,000 feet because length will support the required services at appropriate quality levels.[87] The ALJ concludes the HAI model adequately estimates costs for long loops and that copper loops of up to 18,000 feet are acceptable.

Switching

81. U S WEST uses the SCM model for switching in its cost models, including the BCPM. The SCM model determines how much of various switch resources are consumed in the different switch functions of processing, terminating lines, switching lines, and handling trunks. These resources are assigned costs. Various switch services and features are then costed on the basis of their use of the different switch resources.[88]

---

84 *Id.* at 39.
85 Ex. 334 at 1029-30.
86 Tr. Vol. 8A at 109.
87 Fifth Report and Order, ¶¶68-70.
88 Tr. Vol. 3 at 158.

82. The SCM input processes are highly complex and extremely sensitive to U S WEST's designated inputs, which are unknown, undocumented and proprietary. In addition, there are numerous SCM inputs that require decisions regarding the type of technology and efficient engineering practices that cannot be discerned from any of the documentation or models provided.[89]

83. Despite the complexity of SCM, the model deploys the same switches from the same manufacturer as are currently in place, unless the current switch is an analog switch, in which case SCM deploys a digital switch.[90] Contrary to TELRIC principles, SCM does not consider whether switch from another vendor might be more cost effective than the switch currently used at each location.[91]

84. The HAI model uses a declining logarithmic cost curve based on the cost per line of a switch.[92] The curve is a regression curve based on four observations of switch costs.[93] The HAI uses publicly-available information for switching prices and does not rely on proprietary data. HAI's inputs for developing switching costs may be entered directly out of contract information on prices paid by ILECs for switches, if such data is available.[94]

85. Switch deployment for the purpose of UNE costs should not only involve forward-looking technology, it should also require that the forward-looking technology be least cost. But, as Mr. Legursky observed, "SCM does not universally deploy the least cost equipment."[95] That is because optimal network configuration has changed over time.[96] It cannot by concluded that deploying the same digital switch from the same vendor as is currently deployed in U S WEST's network in Minnesota will meet the least cost criterion.

86. In contrast to SCM, HAI does not explicitly model switch deployments; it simply estimates least cost, forward looking switch costs. Since the purpose of the proceeding is to estimate costs, there is no requirement that a switch costing module actually place particular switches; it is sufficient to estimate switching costs.

87. The FCC found that both the HAI switching module and the SCM were acceptable for use in its Universal Service platform, but chose HAI over BCPM for the switching function because HAI was less complex and because it more fully satisfied the requirement that data, computations, and assumptions be available for review and comment.[97]

---

89 Ex. 314 at 17-18; Ex. 319 at 3.
90 Ex. 603 at 13; Ex. 150 at 6.
91 Ex. 604 at 12.
92 Ex. 603 at 41.
93 Ex. 634 at 973.
94 Ex. 314 at 17-18.
95 Ex. 603 at 13.
96 Ex. 634 at 955.
97 Fifth Report and Order, ¶¶ 75-80.

88. US WEST witness Mr. Wiseman suggests that the HAI Model does not incorporate "a reasonable level of Minnesota specific engineering detail" in its switching costs. But the evidence here is that U S WEST switch contracts are not state-specific. So there is no such thing as Minnesota-specific switch costs. Moreover, the NBI data used by the HAI Model *includes* information on switches purchased by U S WEST. Thus, the HAI Model data does reflect recent switch purchases made by U S WEST.[98] The evidence in this record shows that the HAI switch cost estimates are more accurate than the SCM model's estimates.

HAI Input Values

Common Overhead, Network Support, Cost of Capital

89. The HAI model was filed with default values for its inputs. More accurate cost estimates can be obtained by replacing a number of the HAI's default input values with different values. For reasons discussed below, the ALJ recommends a common overhead rate of 13.09%, a network support factor of 85%, and a cost of capital of 9.6% for both the HAI model and the AT&T NRCM.

Allocation of Common Costs

90. If common costs are assigned to loops in different density zones based on investment, rural loops with greater levels of investment per loop will be allocated a greater dollar amount of common cost than will urban loops. For example, if common overhead costs are allocated based on investment, there is $.62 per month in common cost allocated to an unbundled loop in areas with 10,000 or more lines per square mile compared with $18.39 per month in common cost allocated to unbundled loop in areas of 0.5 lines per square mile. If common costs are allocated to the loop based on access lines instead, using the same assumptions, each loop is allocated $1.70 in common cost.[99]

91. There is little relationship between common costs and level of investment. General support expenses, network operations expenses, and other taxes should be allocated to the loop based on access lines rather than investment. Unless the expense is a function of the level of investment, the allocation of these expenses based on investment will distort geographic deaveraged loop costs. There are significant cost differences between these methods of allocating these expenses to the loop.[100] The ALJ concludes that allocating the same dollar amount of general support expenses, network operations expenses, other taxes and common overhead costs to each loop in the HAI is the correct method to use in developing geographically deaveraged loop costs.

---

98 Ex. 319 at 4.
99 *Id.*
100 *Id.* at 28-29.

Depreciation

92. Minn. Stat. § 237.12, subd. 4, requires that "forward-looking depreciation rates" be used in estimating the prices for interconnection and network elements. In its August 15, 1997 filing in Doc. No. P421/D-891, the Department recommended forward-looking, economic depreciation lives and salvage values for U S WEST. The Department's recommended lives and values are set forth in Ex. 621, EF-2.

93. Copper cable represents approximately 50% of U S WEST's total loop investment in RLCAP.[101] U S WEST assumes a 15-year life for buried cable. The company estimates that aerial and underground cable will last only 75% as long as buried cable.[102] The Company seeks 11.3 year lives for these two kinds of cable.[103]

94. U S WEST relies heavily on a 1995 publication by Technology Future, Inc. (TFI). TFI projected a 20-year life for buried distribution copper cable, which U S WEST shortened to 15 years, claiming that was necessary to translate TFI's depreciation study to a forward-looking scenario.[104] For aerial copper and underground copper U S WEST proposed 11.3 years. U S WEST witness Mr. Easton defended the shorter life for aerial copper because of exposure to the elements and the shorter underground copper life because urban interoffice and feeder route cabling are going to be more quickly replaced by fiber.[105] His explanation does not explain why such diverse factors result in exactly equal lives for different kinds of cables.[106]

95. U S WEST also relies on comparisons to depreciation lives of AT&T, ELI, TCG, Phoenix Fiber, and McLeod.[107] However, none of these companies are local exchange carriers. Rather, they are competitive access providers who have deployed fiber in high density areas.[108]

96. Several considerations must be borne in mind in evaluating U S WEST's proposed lives and salvage values. First, the development of new technologies that permit wideband services to be provided over copper cable suggests that copper may have a longer life than that proposed by U S WEST.[109] Second, the TFI report is "too speculative to be used as evidence to support the very short lives proposed by U S WEST."[110] The sponsors of the report are incumbent local exchange carriers who, like U S WEST, have a strong financial interest in increasing depreciation expenses.[111]

---

101 Ex. 351 at 4.
102 Ex. 142 at 5.
103 Ex. 623 at 6.
104 Ex. 142 at 8.
105 Tr. Vol. 4 at 114.
106 Tr. Vol. 4 at 115-6.
107 Ex. 142 at 16.
108 Ex. 623 at 6.
109 Ex. 503A at 31.
110 Ex. 621 at 23.
111 Ex. 623 at 7, Tr. Vol. 13 at 128.

97. AT&T and MCI recommend the lives and salvage values approved by the FCC in 1995 for U S WEST. However, no evidence suggests that these values developed for use in rate of return proceedings are forward-looking, economic values.[112] Like U S WEST, AT&T and MCI are also financially interested parties, but their interest is to underestimate depreciation expense.

98. The Department's proposed depreciation values are those it advocated on August 15, 1997, before the Commission in U S WEST's most recent depreciation case before the Commission. These values are forward-looking, economic depreciation values, developed by the Department, a party whose bias is toward the "public good" and achieving the telecommunication goals set forth in Minn. Stat. § 237.011. The ALJ adopts these depreciation rates.

Labor Costs

99. Dr. Fagerlund testified that the regional labor adjustment factor of 0.99 for Minnesota should be used because labor costs in Minnesota are one percent less than the default level for labor costs in HAI. This factor adjusts the wage portion of facility installation costs. The Department used this factor in its HAI model runs.[113] The Administrative Law Judge recommends that it be adopted by the Commission.

Drop Lengths

100. A significant factor in estimating drop costs is the length of the drop. The HAI model permits users to set drop lengths by density zone.

101. Mr. Legursky performed his own analysis of the HAI drop lengths because the HAI sponsors' decision to count special access lines on a circuit-equivalent basis and then to multiply the default drop length by the number of lines per density group was likely to skew the state-wide average drop length that could be calculated from the model. Because the BCPM counts access lines on a pair equivalent basis, Mr. Legursky used its data for lines per density group. Multiplying the HAI default drop lengths for each density group by the BCPM line counts yielded an average drop length of 74 feet.[114]

102. U S WEST witnesses Mr. Schmidt and Dr. Fitzsimmons both criticize the HAI drop lengths as too short.[115] Mr. Schmidt supervised a survey for U S WEST that indicated an average loop length of 171 feet. He had U S WEST technicians visually estimate drop lengths on all visits to customer premises.[116] On the basis of Mr. Schmidt's survey, Dr. Fitzsimmons testified that the Department's recommended average length of 95 feet was unreasonable.[117] In fact, Mr. Legursky recommends an

112 Ex. 621 at 22.
113 Ex. 621 at 25-26.
114 Ex. 603 at 45.
115 Ex. 187 at 4. Ex. 176 30-31.
116 Ex. 603 at 45.
117 Tr. Vol. 2 at 218.

average drop length of 109 feet.[118] In his analysis of HAI, Dr. Fitzsimmons uses an average drop length of 129 feet that he obtained from the BCPM default values.[119]

103. Mr. Schmidt's survey was not sufficiently reliable to be used for calculating drop costs in this proceeding. The survey was quite haphazard, not random, not tested, not uniform, and subject to gross estimations by the data collectors.

104. Neither should the BCPM default drop lengths be adopted as suggested by Dr. Fitzsimmons. The length of drops in BCPM is determined by lot size.[120] The ultimate grid is divided into four quadrants and within each quadrant, a road-reduced area is formed that is into lot sizes from which drop lengths are calculated. The drop length in BCPM thus depends on the assumption made that sizes the road-reduced area. An assumption of a 600-foot buffer would increase drop length while assuming a 400-foot buffer decreases drop length.

105. Contrary to Dr. Fitzsimmons' recommendation to put the BCPM default drop lengths into the HAI model, Mr. Legursky sought to develop appropriate drop lengths. Mr. Legursky testified that he was influenced in his judgment as to the correct average drop lengths by Mr. Schmidt's testimony but that he took those numbers with a "grain of salt."[121] Mr. Legursky estimated the drop length required for the least dense zones, taking into account typical setback distances and distribution cable locations, and derived an average length of 250 feet. The HAI default value for the least dense zone is 150 feet. Mr. Legursky accepted 50 feet as a reasonable average drop length for the most dense zone and figured a smooth curve between 250 foot value and the 50 foot value for the intermediate density zones.[122] Mr. Legursky calculated the correct weighted average drop length to be 109 feet, an increase of 47% over the HAI default value. Mr. Legursky's recommended drop length by density zone is given in Table 1.

---

118 Tr. Vol. 2 at 226-27; Ex. 603 at 46.
119 Tr. Vol. 2 at 218
120 Tr. Vol. 2 at 224.
121 Ex. 634 at 981.
122 Ex. 634 at 1052-53; JWL-2 Table A17.

Table 1
(Ex. 604, JWL-2; Ex. 607 at 15)

Density Group	HAI 5.0 Default	Recommended Drop Length	Recommended % of Buried Drop
0-5	150	250	0.84%
6-100	150	200	0.88%
101-200	100	150	0.93%
201-600	100	125	0.95%
601-800	50	110	0.92%
801-2550	50	90	0.83%
2551-5000	50	80	0.74%
5001-10,000	50	70	0.50%
10,000+	50	50	0.25%

106. Table 1 also gives Mr. Legursky's recommendation for the percentage of drops that should be buried. Mr. Legursky's recommendation reflects the fact that many multi-tenant buildings will have no drops and that in many less dense areas, significant land areas will be unutilized. Because aerial drops are less expensive than buried drops, increasing the percentage of aerial drops corrects for the fact that the HAI model overstates drop costs.[123]

107. In the Universal Service docket, the ALJ recommended that the Commission adopt Dr. Fitzsimmons' drop lengths rather than Mr. Legursky's. The ALJ has reconsidered that position and, based upon the additional evidence presented here, recommends adoption of the Department's recommended drop lengths and placement percentages.

Placement Mix

108. Cables may be hung on poles, buried in a sheath, or placed underground in conduit. Mr. Legursky testified that the HAI uses too high a percentage of aerial placement. Local governments are increasingly prohibiting the aerial placement for aesthetic and safety reasons. Because aerial placement is frequently the least expensive type of placement, the HAI consequently understates costs.[124]

109. The FCC's scorched node assumption does not provide much assistance in determining the appropriate placement mix. It can be argued that telephone poles are scored, too. But, if even just electric company utility poles remain in place after scorching, there will be a great incentive to hang cables from them. While communities might find aerial placement unsightly, they will no doubt prefer adding a telephone wire to the electric wires to having streets torn up to place cable underground. As with the structure sharing assumptions discussed below, the scorched node concept in the placement context leads to unproductive debate.

---

123 Ex. 607 at 15-18.
124 Ex. 603 at 51.

110. In preference to debating how something that will never happen might affect placement mix, the Department has recommended that the most best estimate of what an efficient, forward-looking competitive firm would experience is the recent experience of a competitive firm in Minnesota that provides local service. The ALJ adopted that position in the Universal Service docket. The Department looked to U S WEST's recent experience as a starting point for modeling purposes.[125] Mr. Legursky examined U S WEST's current copper placement mix for copper plant and used the HAI Investment Input Worksheet to determine the percentage of distribution and copper and fiber feeder cable in each density group.[126] He then produced a table for distribution plant and a table for each kind of feeder plant by setting the structure mix percentage for each density group in such a way that when those percentages are applied to the each density group's distribution and feeder cable amounts, the resulting weighted averages for the percent of distribution and feeder cable by structure type matches U S WEST's recent structure placement percentages. The recommended input values for the percentage of distribution placement by density zone and placement type are given in Table 2 below. Table 3 gives the same information for copper feeder placement and Table 4 provides the same information for fiber feeder.

125 Ex. 621 at 10.
126 Ex. 603 at 52-53; JWL-2 tables A11-A16.